

The Economics of Inequality in Education

Jandhyala B G Tilak



'...rich in many different aspects in terms of the review of the literature, the approach of [the] analysis, the wide array of data and the thrust of [the] conclusions.'

Professor Theodore W Schultz

'Such regional studies are extremely important. Dr Tilak's work is of high quality and I have no doubt that it will attract attention.'

Professor Tapas Majumdar

There has been a marked propensity in India, as in other developing countries, to treat education — particularly that of the weaker sections — more as a welfare activity than as an intrinsic part of development. As a result, policy planners have by and large neglected this vital area.

Dr Tilak's stimulating book categorically disproves this view. He provides ample evidence to show that investment in the education of weaker sections is more than justified even from the point of view of economic returns alone, quite apart from the social, historical and cultural implications.

Based on primary data, the book provides an in-depth analysis of the reasons why the same kind of education results in differential rates of return for different sections of the population. The author shows how, in fact, the returns to education would be far greater if attention is concentrated on the very groups most discriminated against, i.e., women and backward castes.

At a time when the entire question of education has become the focal point of country-wide debate, Dr Tilak's study is of particular relevance.

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**THE ECONOMICS of
INEQUALITY
in EDUCATION**

JANDHYALA B G TILAK



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To
my father
and to
the memory of my mother

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Foreword

The contribution of education to economic growth and income distribution is well recognised. The quantum and nature of contribution vary significantly across different socio-economic milieu. This study *The Economics of Inequality in Education*, which is a revised version of Dr. Jandhyala B.G. Tilak's doctoral thesis in economics prepared at the Institute of Economic Growth investigates such inequalities in the contribution of education to different groups of the population. It examines, *inter alia*, the following hypotheses: returns to education accrue differentially to different groups of the population; there exists inequality in human capital formation between different groups of the population and the distribution is skewed against the weaker sections, and the weaker sections are subject to labour market discrimination. Based on primary data on about 1,000 members of the workforce drawn from a sample of approximately 400 households in West Godavari district in Andhra Pradesh, Dr. Tilak estimates the rates of return to education, examines the stock as well as flow aspects of human capital development and analyses discrimination in the labour market.

Dr. Tilak provides strong evidence in favour of investment in the education of the weaker sections, viz., backward castes and women strictly on economic efficiency grounds, even when they are subject to discrimination in the labour market. This provides support for the argument generally advanced in favour of such investments for the weaker sections on social, cultural and historical grounds. If efforts are made to reduce discrimination against the weaker sections both in the school and outside, the returns to education of the weaker sections would undoubtedly be much higher than to other

sections of society. It is, therefore, imperative that governments treat the expenditure on education of the weaker sections not as welfare expenditure or burden, but as an investment that pays, thus warranting larger public investment in the education of the weaker sections. While this policy conclusion itself, *inter alia*, is an important contribution, the technical justification of this conclusion seems to be a major contribution of Dr. Tilak's work. Another major strength of this work is that though this is a case study from one point of view, it goes beyond the confines of the area under study, and Dr. Tilak further develops an approach to analyse the differential rates of return to education.

This study makes a significant addition to the scanty literature on the economics of education in India. Professor Theodore W. Schultz, a pioneer in the economics of education, and a Nobel laureate in economics commented that the work is rich in many different aspects in terms of the review of literature, the approach of the analysis and the thrust of the conclusions.

Professor Tapas Majumdar, a distinguished economist found the work extremely important and of high quality and that though, it is confined to the State of Andhra Pradesh, particularly a district, the conclusions have general applicability in the context of most parts of India.

I am sure that both researchers in the economics of education and educational planners will find the study both useful and stimulating.

Institute of Economic Growth
Delhi

K. Krishnamurty
Director

Preface

Economic analysis of education interested economists a quarter century ago. While the sixties witnessed economists of education borrowing models from economics, by the mid-seventies, the models were adapted and the methodologies were sharpened in such a way that they became distinct. Empirical applications of these models increased over the years at a very fast pace. Indeed, research in the area swelled over the years into magnificent proportions, firmly laying the basic tenets of the economics of education—like the investment nature of education, human capital formation and the contribution of education to economic growth and income distribution.

If one were to identify a single area in the economics of education in which the largest number of studies have been conducted, it is the rate of return analysis. The present one is yet another addition to the burgeoning literature. These studies implicitly emphasise the need to recognise educational planning as a part of the overall planning for the allocation of resources (i.e., educational planning has to be consistent with economic planning) and they also stress the need for ensuring that the decision-making process in education should be based on more scientific and relevant information rather than on intuitions. Yet, policy-makers concerned with the education sector in developing countries treat it as a welfare activity, and keep it outside the planning framework. The expenditure on education is rarely taken into account in national income estimates. Public resources are allocated for educational systems erratically and largely on non-economic grounds. More particularly, the education of the weaker sections is funded as a measure of welfare and social justice, if not generosity and charity.

It is by now established, beyond doubt, that education is an investment, an investment that pays. The present study analyses the economic returns to investment in the education of the weaker sections as compared to others. The study, which is an application of the rate of return model, with marginal modifications, to data on a South Indian district, West Godavari, shows that investment in the education of the weaker sections, viz., backward castes and women in our economy pays dividends, comparable to, if not higher than, investments made in the education of non-backward castes and men respectively, despite the fact that there exists much discrimination against the weaker sections when it comes to employment and wages. It provides an economic rationale in support of arguments for allocation of more resources for the education of the weaker sections. The study argues for a reduction in inequalities in investment in education between different groups of the population and for reducing discrimination in employment and wages, so that the economy would reap maximum gains from investment in education.

This book is based on my doctoral thesis prepared at the Institute of Economic Growth and presented at the Delhi School of Economics, University of Delhi in 1980. The original has been revised and updated.

The study was carried out under the joint supervision of the late Professor J.N. Sinha and Professor S.N. Mishra at the Institute of Economic Growth. Professor Sinha gave me his time and scholarship in ample measure. I cannot thank him enough for his fruitful guidance and encouragement. My profound debt is to Professor Mishra not only for his valuable guidance, but also for his constant encouragement which sustained me in seeing this study through successful completion and its publication.

I have benefited much from the comments and suggestions received from several experts in the field. I am particularly grateful to Professors V.N. Kothari, P.R. Panchamukhi, Mark Blaug, A.M. Nallagoundan, Swapna Mukhopadhyay, A.K. Dasgupta and H.N. Pandit. I would also like to express my gratitude to Professor Theodore W. Schultz for his kind and encouraging words of appreciation of my work and for his permission to refer to his comments.

I had presented the results of this study in a few seminars/workshops at the Institute of Economic Growth, the Delhi School

of Economics, the Indian Institute of Education, the National Institute of Educational Planning and Administration, and at the 18th Annual Conference of the Econometric Society of India. The comments received from the faculty of these institutions and participants of these seminars were helpful and are gratefully acknowledged. In this context, I would like to particularly mention Professors C.H. Hanumantha Rao, A.L. Nagar, Mrinal Dutta Chaudhuri, D.B. Gupta, A.R. Kamat, Moonis Raza and D.P. Chaudhri.

My interest in the subject was first kindled by my teacher, Professor B. Sarveswara Rao. I remember with gratitude the advice and help I received from Professors K.L. Krishna, D.U. Sastry and K. Krishnamurthy at several stages of my work.

From the thesis to the book, there has been a long gestation. A critical phase of this period includes the time that I spent at the Indian Institute of Education, Pune, where I enjoyed long discussions with the late Professor J.P. Naik on the work. Another phase includes my stay at the National Institute of Educational Planning and Administration, New Delhi, where I still benefit from discussions with colleagues on various dimensions of educational planning.

Numerous others helped me at different stages in various ways. I would like to acknowledge the programming assistance of N.A. Kazmi and P. Saibaba, the cartographic help of Bachi Ram and the support that I received both in work and at home from J.N. Rao.

I am indebted to the Institute of Economic Growth for more than one reason: for providing me a fellowship at the initial stages of my work, for providing me with supervision and guidance by its senior, sincere and unassuming faculty members and finally for publishing it in its series *Studies on Economic Development and Planning*. The keen interest of Professor K. Krishnamurthy throughout needs special mention.

'That what touches us nearer shall be last serv'd.' I wish to mention the cheerfulness of my wife Punya and children Kanu and Chinnu which provided all the impetus required to produce this work in this form.

May 1986

Jandhyala B.G. Tilak

Introduction

A BRIEF HISTORICAL PERSPECTIVE

Even though the concept of 'inequality in education' appears to be a concern of the present century, its origin can be traced back to the sixteenth and seventeenth centuries in the West.¹ Some of the mercantilists, like Hales and Malynes who were essentially feudalistic in their outlook, wanted education to be confined to specific privileged groups of society. While Edward Misselden and Thomas Mun wanted education to be extended to industrial workers besides merchants, it was William Petty who first advocated equitable distribution of education. Nehemiah Green and James Stewart also of the Mercantilist period, advocated mass education so as to increase agricultural productivity in particular and society's progress in general. Lord Palmerston favoured the spread of literacy. The eighteenth and the nineteenth century school reformers in the United States like Horace Mann, Henry Barnard, James G. Carter, Robert Dale Owen, and George H. Evans favoured educational opportunities to be extended to the poorer groups. Horace Mann, a typical example of these reformers, viewed the school as an effective instrument to achieve justice and equality of opportunity and remove poverty. In fact, as Husen (1981: 69) says, 'the roots of the classical liberal conception of equality of educational opportunity are in the 18th century with Locke, Helvetius and most important of all, Jean Jacques Rousseau'.

¹ The review of the ideas of the earlier economists and educationists is based on the studies by Blitz (1961), Johnson (1964), Husen (1981), Gintis and Bowles (1977), Vaizey (1962), Miller (1966), West (1964-a and 1964-b), Kiker (1968), Blaug (1975), and Kneller (1968).

recommendations are yet to be implemented. The Commission used the manpower requirements model with fixed input-output coefficients.⁸ Other studies applying the manpower model to educational planning include Ramanujam (1973), Veena (1974), Prakash (1975), and Biswas *et al.* (1975). Although quite apart from these studies, yet worth mentioning, is the study by Chaudhri (1968) using the production function model to agriculture in India with education as one of the explanatory variables.

Of the three approaches to educational planning, the adoption of the manpower planning approach by the Government appointed Education Commission creates an impression that policy-makers in India prefer to rely on the manpower planning model than on any other approach. But there is little further evidence in support of this. The manpower planning approaches are generally confined to higher levels of education. The rate of return studies conducted in the field of Indian education yielded results,⁹ which more or less conform to the explicitly stated objectives of educational planning in India. The objectives as seen from the Five-Year Plan Documents are: (i) universalisation of elementary education, (ii) eradication of illiteracy, and (iii) reduction in inequalities between regions, income classes, sex and caste groups. These objectives are far from having been achieved.

A cursory look at the intra-sectoral resource allocation policy in India indicates where the major weaknesses lie. There is a steady increase in the percentage of resources allocated to higher education during the plan period (9 per cent in the First Five-Year Plan to 19 per cent in the Sixth Plan). At the same time the percentage share of resources allocated to elementary education decreased steadily from 56 per cent in the First Plan to 36 per cent in the Sixth Plan and to 28 per cent in the Seventh Plan.¹⁰ However, the latest indications in the educational policy, such as strong arguments in favour of shifting emphasis from university education to elementary education

⁸ For a critical review, see Tilak (1977: 273-75).

⁹ See Chapter 4.

¹⁰ One may observe that a study of the plan investment in education in India would be quite narrow in perspective, since about 85 per cent of the total public expenditure on education comes from the non-plan category. But even when the plan and non-plan expenditures are combined, the trend features remain the same. See Tilak (1985-b).

(Ministry of Education 1985), clearly show that the conclusions of the rate of return studies may have some impact on the decisions of policy-makers in India. Hence, we believe that in-depth studies of this nature would have more policy relevance.¹¹

THE PROBLEM

The purpose of this study is to examine the various economic facets of inequality in the sphere of education in India. We would be specifically concerned with inter-group inequalities, i.e., inequality between males and females, and between backward and non-backward castes. Women and backward castes constitute, what are called the weaker sections in India. As in many other societies, the opportunities open to women in India are restricted. First, for a long time education of women was socially discouraged. Second, today even when some employment opportunities are offered to women their household responsibilities do not allow them uninterrupted labour force participation. Finally, women are subject to several forms of economic and non-economic discrimination.

In India, some castes are recognised as backward castes, comprising mainly of Harijans, scheduled castes and scheduled tribes.¹² For generations these castes have been deprived of their legitimate

¹¹ However, it is not to say that the rate of return method solves all the problems. An approach integrating the two—rate of return approach and the manpower planning approach—may serve better in the context of overall educational planning. However, if the choice is between these two approaches, the former may be preferred to the latter. See Blaug (1972-b) for more details.

¹² The group of backward castes, itself an aggregate, includes scheduled castes like *Mala*, *Madiga*, *Ghusi*, *Relli*, etc., who are more familiarly known as Harijans, as named by Mahatma Gandhi; scheduled tribes mainly comprising of *Koyas* and *Konda Doras* in Andhra Pradesh, and other backward castes such as *Chakali* (dhobis), *Mangali* (barbers), *Medari* (basket-makers), *Telukula* (oil-traders), *Saleelu* (weavers), *Gollalu* (shepherds), etc. (Their corresponding traditional occupations are given in the parentheses.) Even though these groups are identified as backward on the basis of their caste, by economic criterion as well, a great majority of the people belonging to these castes constitute the backward classes. This is true in the case of our sample also relative to the non-backward castes. See Shah and Srikantiah (1984) and Banerji and Knight (1985) for a recent discussion on caste discrimination in India. The backward castes are ensured special treatment by the State under the Indian Constitution. See Beteille (1983) for details.

S.C.R.T., West Bengal

Date... 13-7-87



social and economic status. For the first time after independence, a majority of adults belonging to the backward castes, along with their children in schools and colleges, constituted the first generation of learners. The incidence of poverty, malnutrition, ill-health, illiteracy, etc., is higher among the backward castes than among others.

Against this background, we propose to test the following hypothesis:

Returns to education accrue differently to different groups of population and unfavourably to the weaker sections. In other words, rates of return to education are lower for the weaker sections than for their counterparts (i.e., lower for women and backward castes than for men and non-backward castes respectively).

The reasons for differential rates of return are to be found either in the functioning of the school system and/or in the functioning of the labour market.¹³ With respect to the functioning of the school system, the main reasons for differential returns could be traced to the following factors:

1. Inequality in educational opportunity.
2. Inequality in the quality of schooling.
3. Differences in the magnitudes of impact of education on earnings.
4. Inequality in investment in education.¹⁴

With regard to the functioning of the labour market, market discrimination of various kinds produces differential returns to education. We shall briefly discuss the two sets of reasons.

School Factors

1. *Inequality in Educational Opportunity*: Despite several legislative measures such as reservations in schools and colleges, and scholarships and stipends, there exists wide inequality of

¹³ See Hauser (1973) for more details.

¹⁴ See Psacharopoulos (1982) for a description of the path analysis of the three stages of inequality. See also Tilak (1979-a).

educational opportunities by sex and caste groups in our system. The coefficient of inequality in education¹⁵ between sex groups in India was estimated to be 42.8 per cent in 1971 (Tilak 1975) and between caste groups 33.3 per cent (Nautiyal and Sharma 1979).

2. *Inequality in the Quality of Schooling:* Both quantitatively and qualitatively the existing educational facilities in India are far less than adequate. Further, there exists wide disparity in the quality of schooling various groups of population receive. Particularly in India, as in several other countries, we have a dual schooling system—private schools for the privileged sections of society and common or public schools crowded by the weaker sections. Apart from this dualism, there still exist in India, for several reasons, *special* schools for scheduled castes, and *Ashram* schools for scheduled tribes. The qualitative differences between public schools and private schools on the one hand, and between public schools and special schools on the other hand, are well recognised. Suma Chitnis (1975) has provided some insight into the problem relating to the quality and standards of colleges crowded chiefly by scheduled castes/tribes *vis-a-vis* others. Blaug *et al.* (1969) and Bhagawati (1973) also provide empirical evidence that only those belonging to the higher socio-economic strata get admission to some of the prestigious institutions of the country.¹⁶
3. *Differences in the Influence of Education:* Educational attainment is significantly influenced by innate ability, motivation, social background, parental support, etc. Schools throughout the world have failed to minimise the influence of these factors and as such inequalities still persist. Studies on the educational production function indicate that the level of ability, socio-economic background, etc., influence academic achievement which, in turn, influences economic attainment. It is well known that people belonging to different socio-economic strata have different levels of innate ability, motivation, social support, etc. This results in differential impact of ability and other factors on education and through education on earnings.

¹⁵ Coefficient of inequality is defined as $1 - \text{Coefficient of equality}$. See Naik (1971) for the concept of coefficient of equality.

¹⁶ See also Tilak and Varghese (1985).

4. *Inequality in Investment in Education:* The size of the investment in education exercises a significant influence on the rates of return to education, and this depends upon the relative economic strength of individuals belonging to different groups of the population. Both public and private investment in education are found to vary significantly for different groups of the population.

Labour Market Discrimination

With regard to the functioning of the labour market, market discrimination persists against the weaker sections of society, particularly against the backward castes and women in providing employment opportunities as well as in the payment of wages. Discrimination in a less developed economy like India is reinforced because of labour market imperfections, and the lack of labour mobility for different reasons. A few research studies conducted in India lend support to this contention, as do the studies conducted abroad. The nature of sex discrimination in India is similar to that in other countries, while caste discrimination in India is more or less similar to racial (white-nonwhite) discrimination in Western countries. However, the magnitude may vary. Hence, it is appropriate to hypothesise and to verify whether the rates of return to education in India differ across various groups of population. Further, inequality due to discrimination can be tested with respect to human capital formation and economics of labour market discrimination.

Thus, the relevant subsidiary hypotheses to be tested can be stated as follows:

There is inequality in human capital formation between different groups of population, the distribution being skewed against the weaker sections. And, the weaker sections are subject to labour market discrimination in employment and wages.¹⁷

¹⁷ Workers in rural areas are also aptly referred to as weaker sections. Hence it would be appropriate to extend and test these three hypotheses with respect to rural-urban workers also. For such an attempt, see Tilak (1982-d).

SCOPE AND PLAN OF THE STUDY

In the absence of any recent secondary sources of data, the present study is based upon primary data collected from a sample of households in the West Godavari District of Andhra Pradesh. A random sample survey, conducted for the purpose, yielded data on approximately 1,000 members of the workforce. A detailed account of the sample survey has been presented in Chapter 3. In order to situate the analysis and results of this survey, we propose to study in the following chapter inter-state inequalities in educational development, with the objective of explaining the relative position of Andhra Pradesh *vis-a-vis* other states in India, besides inter-district inequalities within Andhra Pradesh. The latter gives the relative position of the sample district—West Godavari. Chapter 4 gives a comprehensive review of the rate of return studies on Indian education, followed by a discussion on the method of internal rate of return and the adjustments that one is likely to make while estimating these rates in Chapter 5. The rates of return to education accruing to different groups of the population are estimated and the results are analysed in Chapter 6. Inequality in the stocks of human capital embodied in different groups of the population is the theme of Chapter 7, while Chapter 8 focuses on the problem of economics of discrimination in the labour market. The last chapter presents a summary of the main conclusions and the policy implications that follow, along with the limitations they carry with.

Regional Inequality in Educational Development in India

INTRODUCTION

The main objective of this chapter is to locate where the sample district stands with respect to educational development in an all-India macro perspective. With this end in view, first an inter-state analysis was done with respect to educational development on the basis of studies conducted by others including our own. This brings out the relative position of the State of Andhra Pradesh among the major states of the Indian Union. At the next stage, educational disparities between different districts in Andhra Pradesh were studied, thus locating the place of the sample district, West Godavari District.

EDUCATIONAL INEQUALITY IN INDIA: INTER-STATE ANALYSIS

There are a few important studies of state-wise analysis of educational development in India, of which mention should be made of Panchamukhi (1970), Rudolph and Rudolph (1972), Pandit (1977), Heyneman (1980), Manocha and Sharma (1979) and Tilak (1979-b and 1981-b).¹ Clearly no uniform results can be expected from these studies because (a) the methods adopted differ from study to study; (b) the nature and number of variables considered vary; and (c) the

¹ Tilak (1978-a) gave a similar account of inter-state disparities in literacy in India.

reference period is not the same. For instance, the Rudolphs, Pandit and Heyneman ranked the states by pooling together the unweighted rank order scores of individual variables of educational development. On the other hand, applying the principal component analysis to educational development, Panchamukhi (1970) and Tilak (1981-b) constructed indices of educational development on the basis of which different states in India were ranked and compared. While Reddy used the taxonomic method, Tilak (1979-b) constructed a cost weighted index of educational development. Manocha and Sharma used cost proportions for the same purpose.

The variables considered vary significantly from study to study in their definition and number. Rudolph and Rudolph, for instance, considered the enrolment ratios at primary, middle, high/higher secondary, secondary (technical/vocational) and higher levels. Their rank order, thus, refers to state enrolment performance. Panchamukhi took into account eleven variables including educational expenditure as per cent of State income, enrolment ratios, percentage of trained teachers to total number of teachers at the school level, and the total number of teachers. Pandit, on the other hand, concentrated only on school level education—enrolment ratios at primary, and middle levels, percentage of girls at all the three school levels, teacher-pupil ratio and percentage of State budget expenditure on education. In addition to enrolment rates, percentage of girls and percentage of untrained teachers, Reddy considered the literacy rate—a stock variable along with the flow variables. Tilak's (1981-b) study was based on enrolment ratios, pupil-teacher ratios and public (recurring) investment in education as per cent of State income at all levels of education, while in the other study Tilak (1979-b) took into account only enrolment ratios and direct institutional cost of education per pupil. Heyneman's ranking refers to ten indicators of formal and non-formal education—per cent of age group enrolled at lower secondary and upper secondary levels, upper secondary per student expenditures, upper secondary percentage of students passing examinations, per capita number of books published, literacy rate, per capita number of male workers undergoing non-engineering trade training and engineering trade training, per capita number of apprentices in training, etc. Manocha and Sharma constructed an index of the stock of human resources considering the stock of population with different levels of education and weighting them by cost proportions.

The reference period of these studies also varies—1960–61: Panchamukhi, and Rudolph and Rudolph; 1968: Tilak (1981-b); 1969–70 and 1970–71: Reddy and Heyneman; 1973: Pandit; 1975–76: Tilak (1979-b); and 1961 and 1971: Manocha and Sharma.

All these factors should be taken into account while explaining the differences in the results of the above studies. It may be noted that except Heyneman's findings² which differ very significantly from the findings of others, the other studies reveal a somewhat broad consensus picture. Thus while Kerala, Maharashtra, etc., top the list in all the studies, Bihar, Rajasthan and Orissa remain at the bottom whereas states like Andhra Pradesh occupy the middle position. The next task is to determine where the sample district—West Godavari stands within the State of Andhra Pradesh.

EDUCATION IN ANDHRA PRADESH

Andhra Pradesh, situated on the south-eastern coast of India, was formed into a state in 1956 out of the eleven districts from the erstwhile Madras State in 1953 and the nine Telangana districts which were under the princely rule of the *Nawab* of the *Nizam*. At present, the State has twenty-three districts with Hyderabad City as its capital. 29.7 per cent of the State's population is literate according to the 1981 Census. It occupies the sixteenth position among the twenty major states of the Indian Union (excluding Jammu and Kashmir and Assam) in respect of literacy.

According to the 1982–83 provisional figures, Andhra Pradesh spent 4.7 per cent of the State income on education, which works out to Rs. 74.10 per capita. Nearly 23.2 per cent of the budget (revenue) expenditure in 1983–84 was invested in education. 97.3 per cent of the population in the concerned age group (6–11) in the

² Heyneman's findings interestingly lead one to conclude either that the omission of non-formal education while studying about educational development is a costlier omission, or that consideration of non-formal education presents a totally reverse (and false?) picture of the problem; or that formal and non-formal education are substitutes, not complements. The last point is evident from the fact that Bihar, Rajasthan, Orissa, Assam and Madhya Pradesh which were at the bottom of the list in educational development according to other studies, occupied the rank order in the first quarter of the list in his study.

State were enrolled in primary level classes and 39.4 per cent in the 11–14 age group in middle level classes. In 1978–79, the latest year for which data are available, 11.0 per cent of the population in the age group 14–17 were enrolled in secondary education and 5.0 per cent in higher general education. More than 96 per cent of the teachers in schools were trained. At present there are eleven universities in the State, including a central university at Hyderabad, a women's university at Tirupati, an open university, an agricultural university and a technological university at Hyderabad.

The State enjoys a per capita income of Rs. 1,590 in 1982–83 (at current prices), which is a little less than the national average. According to the Seventh Finance Commission (1977), 7.4 per cent of the people below the poverty line in the country—the seventh largest percentage—live in the State. In this sense, the State is economically backward ranking among the fifteen major states, ninth in per capita income or tenth in poverty ratio (Raj Krishna 1980). Demographically, the State had a population of 53.4 million in 1981. There were 975 females for every 1,000 males. Scheduled Castes and Tribes constituted about 20.8 per cent of the State population.

Table 2.1 shows the growth of education in the State from 1955–56 to 1983–84. It may be noted that the enrolments increased at an average annual rate of growth of 3.4 per cent at the primary level, 5.8 per cent at the middle level, 5.0 per cent at the secondary level, 7.0 per cent at the intermediate level, 10.5 per cent at first degree (general), 10.2 per cent at second degree (general) and 2.2 per cent at the higher (professional) level. On the whole, the total enrolments grew at a rate of 4.2 per cent. A striking feature that deserves to be noted is that the education system in the State is weak at the bottom and heavy at the top. This is a common feature of the education system in the country,³ and the State of Andhra Pradesh is no exception to this.

Further, it may be noted that while in absolute terms there exists wide inequality in educational opportunity as the enrolments by sex groups in this table indicate, and that women still lag far behind men, the rate of growth of enrolment in case of women exceeds that of men. While this may be primarily due to the relatively smaller

³ See Nallagoundan (1967) and Pandit (1977).

TABLE 2.1 Growth of Education in Andhra Pradesh (Enrolments)
1955-56 - 1983-84

(Figures in millions)

Educational Level	Enrolment in		Annual Rate of Growth (Per cent)
	1955-56	1983-84	
<i>All</i>			
Primary	2.36	6.10	3.4
Middle	0.31	1.52	5.8
Secondary	0.18	0.71	5.0
Intermediate	0.049	0.33	7.0
I degree (general)	0.011	0.180	10.5
II degree (general)	0.001	0.015	10.2
Higher (professional)	0.013	0.024	2.2
Total	2.93	9.28	4.2
<i>Men</i>			
Primary	1.51	3.56	3.1
Middle	0.25	0.99	5.0
Secondary	0.16	0.48	4.0
Intermediate	0.03	0.25	7.9
I degree (general)	0.01	0.134	9.7
II degree (general)	0.0005	0.012	12.1
Higher (professional)	0.012	0.021	2.0
Total	1.97	5.45	3.7
<i>Women</i>			
Primary	0.86	2.53	3.9
Middle	0.061	0.54	8.1
Secondary	0.022	0.22	8.6
Intermediate	0.004	0.09	11.8
I degree (general)	0.001	0.046	14.7
II degree (general)	0.0001	0.004	14.1
Higher (professional)	0.0006	0.004	7.0
Total	0.945	3.43	4.7

Note: Primary includes pre-primary level as well. Intermediate includes diploma/certificate, etc., not equal to degree. II degree (general) includes research level.

Sources: *A review of education in India*. New Delhi: NCERT, 1968; *Selected educational statistics at a glance 1983-84*. New Delhi: Ministry of Education, 1985.

base at which women started, it shows that the situation in respect of women's education is fast improving.

TABLE 2.2 Growth of Enrolments in Education in Andhra Pradesh by Caste

(Figures in thousands)

Educational Level	Enrolment in		Annual Rate of Growth (Per cent)
	1964-65	1983-84	
<i>Backward Castes</i>			
Primary	513	1464	5.7
Middle	52	187	7.0
Secondary	77	146	3.4
Higher (general)	3	25*	16.4
<i>Non-Backward Castes</i>			
Primary	3083	4636	2.2
Middle	378	1333	6.8
Secondary	226	564	5.0
Higher (general)	48	270*	13.1

Note: Backward castes include Scheduled Castes and Tribes only. Primary includes pre-primary level also.

* refer to 1978-79.

Sources: *Progress of education of scheduled castes and tribes*. Volumes referring to 1964-65 and 1978-79. *Education in India 1964-65*; *Educational statistics at a glance 1983-84*.

The picture in respect of caste groups is quite similar (Table 2.2). While the absolute figures of enrolment in the case of backward castes (Scheduled Castes and Scheduled Tribes) are far below those of non-backward castes, the rates of growth of enrolment of the backward castes are above those of non-backward castes at all levels except at the higher (general) level. The coefficient of equality, described earlier (Naik 1971), at all levels of education as a whole, between the Scheduled Castes and non-scheduled castes increased from 77.4 per cent in 1961 to 119.1 in 1978-79, indicating a significant improvement in the equality of educational opportunity during this period. The coefficient for Scheduled Tribes improved from 46.7 per cent to 74.2 per cent between 1961 to 1978-79. On the whole, there is a significant improvement in equality of educational opportunity but still the backward castes lag far behind the others.⁴

⁴ See Tilak (1975).

INTER-DISTRICT ANALYSIS IN ANDHRA PRADESH

To compare the level of educational development in various districts of the State, we adopted the method followed by Rudolph and Rudolph, Pandit and Heyneman—a simple method of ranking the districts by individual indicators of educational development and finally summing up the rank order scores. This method is simple and comprehensive, and permitted us to consider as many variables as possible. For the present purpose we considered four variables: the enrolment rates, the expenditure on education, the pupil-teacher ratio, and the number of institutions.

1. As data on population by age groups are not available by districts in the State, we considered enrolment as a per cent of the total population (rather than of the population of the concerned age group) at primary, middle and secondary levels and enrolment per 10,000 population at the higher level.
2. Institutional direct expenditure on education per pupil, which is defined as the expenditure on salaries of teaching and non-teaching staff, allowances, recurring contingencies and maintenance of equipment and buildings, is another variable considered here. Indirect expenditure on education (by levels) and private expenditure could not be considered due to the non-availability of data.
3. The number of pupils per teacher is one of the crude, but readily available indicators to measure the quality of education received by the pupils, though it does not reflect the quality differences among the teachers.
4. The number of educational institutions of different levels per one million population is another indicator of educational development.

The districts were ranked by the level of educational development with respect to each variable and for each level of education. Then the rank order scores were summed up for each variable. For example, the districts were ranked by enrolment rates at various levels and these individual rank order scores (by the level of education) were summed up to arrive at a composite rank order for all levels of education as a whole. The same process was repeated

for all other variables. All the rank order scores of individual variables were pooled together to arrive at the aggregate composite rank order of the districts. On the basis of this exercise⁵ West Godavari District emerges as a district that represents an average picture of the State with respect to educational development, occupying the eleventh position among the twenty-one districts of the State.⁶ Thus, in respect of educational development whereas Andhra Pradesh presents an average picture in India, West Godavari District presents an average picture in Andhra Pradesh.

WEST GODAVARI DISTRICT: A PROFILE

West Godavari District is situated on the western banks of the river Godavari which runs through the entire length of the district. The district spread over 7.8 thousand square kilometres had, according to the 1981 Census, a population of 2.86 million (about 5.3 per cent of the State's population), 1.43 million men and 1.42 million women, with a density of 369 per square kilometre. According to the 1981 Census, nearly 79 per cent of the district population live in rural areas. Approximately 39.5 per cent of the population constitutes the category of 'main' workers. In respect of the participation of the workforce (main workers) as a per cent of the total population, the district occupied the twenty-first position among the twenty-three districts. 37.9 per cent of the total population in the district is literate; the rate being higher for men—43.5 per cent as compared to 31.7 per cent for women. According to the 1981 Census, the Scheduled Castes constituted 16.2 per cent of the district population and Scheduled Tribes 2.3 per cent. In respect of these two respectively, the district ranks twelfth and nineteenth in the State.

In 1980-81, there were in the West Godavari District, 2,190 primary schools with 0.31 million enrolment, 275 middle schools with 78,000 children on rolls and 250 secondary schools with 93,000

⁵ The details are not given here. Interested readers may refer to the original version of the thesis, or to Tilak (1982-c).

⁶ According to the 1981 Census, there were only twenty-one districts. Two districts, viz., Vijayanagaram and Rangareddy were formed later for which data were not available.

pupils. In 1975-76 there were eighteen colleges for general education and eight for professional education. According to the 1981 Census, there were 763 primary schools per one million population, 96 middle schools, and 87 secondary schools in the district, compared to 756, 86, and 70 respectively in the State. The direct expenditure on education per pupil in the district in 1970-71 was Rs. 18 at the primary level, Rs. 53 at the middle level, Rs. 148 at the secondary level and Rs. 367 at the higher level, as compared to Rs. 61, Rs. 75, Rs. 199 and Rs. 431 respectively at the aggregate State level. It has already been noted that the district occupies the middle position among the twenty-one districts of the State in respect of educational development.⁷

⁷ The data originally used refer to 1977-78 and to the 1971 Census, the latest years for which data were available when the study was initiated.

The Sample Survey

THE SAMPLING DESIGN

This study is based mainly on data collected through a sample survey conducted in the West Godavari District. The survey was conducted during the summer of 1977. The sample design involved three stages: (i) the selection of the universe of the study; (ii) the selection of representative villages/town, and (iii) the selection of households.

Based on the aggregate composite rank order of educational development described in Chapter 2, West Godavari District was chosen for the survey on educational characteristics and earnings of the population. Data from the 1971 Census was used in drawing up the sample.¹ The sample included one town from the district and a village each from the eight taluks of the district. While selecting the villages, an attempt was made to select an 'average' village of the taluk in respect of educational development. The criterion at this stage was the number of educational institutions, as data on other variables of educational development at the village level were not available. Among the several villages that have the same number of educational institutions equivalent to the taluk average, one was randomly selected. However, villages geographically adjacent to a town were ignored.

At the third stage, the problem of the size of sample households arose. Due to the resource constraints of the author a rather small sample size was selected—about 2 per cent of the number of households in the selected villages and town according to the 1971 Census. The household selection was, however, done randomly.

¹ Even though the present version was updated on the basis of the 1981 Census, the original design of the sample was based on the 1971 Census data.

After processing the data collected during the summer of 1977, gaps in data were filled through a small supplementary sample survey conducted in 1978. For the purpose of the supplementary survey a few households were purposively selected from the same town and villages. We were aware of the dangers in departing from a random sample. Factors such as age, education, caste, and sex quotas, which we selected could introduce a bias into the sample values which could undermine the inferences one wants to draw about population values. But the purposive sample for filling the gaps, however, was too small in size (8 per cent of the total sample households) to introduce any significant bias into the sample. Thus, our sample of households was largely random and a simple sample design of random nature may not be inappropriate in our context, for as Mahalanobis (1952: 3-4) observed:

When the frame consists of only a list of units and nothing else, whatsoever is known about the field the problem of sample design reduces to the simple case of selecting for investigation a suitable number, n , of elementary units in a random manner so that valid inferences may be drawn from the sample by appropriate methods. It is only when some previous information (which may be only approximate in nature) is available about the field that the problem of sample design becomes important.

Basic socio-economic information was collected from a total of 415 households. For this purpose, a questionnaire was designed, pre-tested and revised. The revised questionnaire was completed for each household on the basis of data collected through an interview with the head of the household or, if unavailable, with the senior most available member of the household. Some of the questions were provided with pre-coded answers. All completed questionnaires were checked on the following day for response and non-response errors. If omissions or ambiguous or inconsistent answers were found, an interview was reconducted either partially or fully with members of the same household.

In short, information relating to 415 households—206 households in rural areas and 209 in urban areas—was collected. The sample yielded data on individual characteristics like educational achievement, age, experience, occupation and earnings of 966 members of

TABLE 3.1 Sample Survey of the West Godavari District, Andhra Pradesh. 1977

Name of the Place	Taluk	Sample Size (No. of Households)		
		Random	Purposive	Total
(1)	(2)	(3)	(4)	(5)
1. Purushottapalli	Kovvuru	12	1	13
2. Nallajerla	Tadepalligudem	28	2	30
3. Khandavalli	Tanuku	34	3	37
4. Srungavruksham	Bhimavaram	35	3	38
5. Denduluru	Eluru	35	3	38
6. Jeelugumilli	Polavaram	7	1	8
7. Borrapalem	Chintalapudi	16	1	17
8. Gummalur	Narsapur	22	3	25
Total (Rural)		189	17	206
9. Tadepalligudem (Urban)	Tadepalligudem	192	17	209
Grand total (Rural plus Urban)		381	34	415

the workforce (678 males, 288 females, 397 backward castes and 569 non-backward castes) as well as data relating to private educational expenditure by educational levels on 722 students presently in schools or colleges (405 boys, 317 girls, 450 non-backward caste pupils and 272 backward caste pupils) who belonged to the same households. The survey further yielded data relating to a large number of voluntary non-participants in the labour force, unemployed and a number of drop-outs from schools. However, data relating to these aspects have not been used in our study, primarily because the non-participants covered largely consisted of housewives; and the number of involuntarily open unemployed as well as the number of drop-outs from schools were very small. The survey data were used mainly to construct the age-education specific earnings profiles and to compute the private costs of education.

The details of the sample size are given in Tables 3.1 and 3.2. Salient features of the places where the survey was conducted are given in the Statistical Appendix (Table 3.1).

Some of the main characteristics of the sample population are as follows. On an average, a member of the workforce in the district earned Rs. 4,475 annually. Group-wise, the average earnings of males were 1.3 times higher than those of the females. Caste-wise

differences in the average earnings were larger. The earnings of the non-backward castes were Rs. 5,151—approximately 1.5 times higher than those of the backward castes. The average schooling of the sample population was 9.5 years. While the average years of schooling of males and females did not show wide variation (9 years for females and 9.7 for males), the inequality was slightly greater in the case of backward and non-backward castes. Interestingly, inequalities were found within groups as well. As far as education is concerned, inequality is maximum within the female group. Standard deviation, a simple measure of inequality, was 6.5 among females. Some of these characteristics of the sample population together with those of the various groups under study are presented in Table 3.3.

OTHER SOURCES OF DATA

In addition to the survey of households, all schools and colleges situated in the selected villages and town were covered with a view to collecting data on several aspects of the educational institutions from their unpublished records, particularly the institutional costs of education. Other sources of data on the institutional costs of education include published and unpublished records of the District Educational Office (West Godavari, Eluru), Directorates of School and Higher Education (Government of Andhra Pradesh, Hyderabad), University Grants Commission and Ministry of Education, Government of India. The school data from the sample area could only supplement the data collected from other sources as far as the institutional costs of education were concerned.² For estimating the average waiting period between attaining a level of education and getting employment, relevant information was collected from the records of the District Employment Exchange (West Godavari District, Eluru) falling in the survey area. Information was also collected on the applicants placed on employment between January 1978 to August 1978, the latest period for

² For example, the data collected on schools exclusively meant for Scheduled Castes and exclusively for girls *vis-a-vis* others helped us in computing the difference in institutional costs between the various categories.

TABLE 3.2 Sample Size by Educational Levels

(per cent)

<i>Educational Level</i>	<i>Men</i>	<i>Women</i>	<i>Backward Castes</i>	<i>Non- Backward Castes</i>	<i>Total</i>
(1)	(2)	(3)	(4)	(5)	(6)
Illiterate	59.2 (58)	40.8 (40)	61.2 (60)	38.8 (38)	100 (98)
Literate	69.8 (44)	30.2 (19)	61.9 (39)	38.1 (24)	100 (63)
Primary	71.9 (82)	28.1 (32)	48.2 (55)	51.8 (59)	100 (114)
Middle	61.5 (88)	38.5 (55)	57.3 (82)	42.7 (61)	100 (143)
Secondary	73.8 (177)	26.3 (63)	33.8 (81)	66.3 (159)	100 (240)
Intermediate	70.8 (68)	29.2 (28)	35.4 (34)	64.6 (62)	100 (96)
I degree (general)	76.3 (90)	23.7 (28)	22.0 (26)	78.0 (92)	100 (118)
II degree (general)	75.0 (48)	25.0 (16)	17.2 (11)	82.8 (53)	100 (64)
Higher (professional)	76.7 (23)	23.3 (8)	30.0 (9)	70.0 (21)	100 (30)
All levels	70.2 (678)	29.8 (288)	41.1 (397)	58.9 (569)	100 (966)

Note Figures in parentheses are actual frequencies.

TABLE 3.3 Characteristics of the Total Sample and Sample Groups of Population

	<i>Annual Earnings</i>		<i>Years of Schooling</i>	
	<i>Mean (Rs)</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>
(1)	(2)	(3)	(4)	(5)
Sample population	4,475	4,077	9.46	5.37
Men	4,861	4,271	9.67	4.82
Women	3,814	3,344	8.94	6.54
Backward castes	3,526	3,977	8.24	6.04
Non-backward castes	5,151	4,068	10.34	4.65

which data were available. During the period a total of 518 applicants were placed on employment and the information collected related to different characteristics of the applicants—date of birth, age, sex, religion, caste, educational achievement, date of registration, date of employment placement, etc. Other sources of data include the Census of India 1971 and 1961 reports for information on population, workforce, etc., and the Statistical Abstracts of Andhra Pradesh for data on several other minor aspects.

The data collected in this way form the basis of computations and results relating to the rates of return, stocks of human capital and discrimination in the labour market described in the following chapters. Before we do this, it is in order that a critical review of literature on this subject be made in order that our own results could be judged in that light.

Returns to Education in India: A Review

INTRODUCTION

There is considerable amount of research done in India and abroad in the field of economics of educational planning in India. However, there are not many rate of return studies on education in India. Sahota made the earliest attempt in 1962.¹ This formed the basis for a more systematic study of Harberger (1965). This is perhaps the first systematic attempt in some detail and has been acclaimed as a pioneering study. Another equally important early study was a doctoral dissertation by Nallagoundan in 1965.² Selowsky (1967) re-estimated Nallagoundan's estimates with a different assumption. Kothari (1967-b), Husain (1967 and 1969), Panchamukhi and Panchamukhi (1969) and Goel (1975) also estimated the rates of return to education in India. Blaug, Layard and Woodhall (1969) conducted a significant study on the returns to education, while enquiring into the causes of graduate unemployment in India. Chaudhri and Rao (1970), Paul (1972) and Shortlidge (1973) estimated the returns to certain types of education at the micro level. The study by Pandit (1972) is perhaps the most recent on Indian education. Chaudhri (1979) and Venkatasubramanian (1980) made similar attempts at the micro level.

The rate of return to education is defined as that rate of discount which equates the sum of the discounted value of benefits to the sum

¹ Sahota's working paper is not accessible.

² His main results were summarised in Nallagoundan (1967). References made in the present study refer to the latter paper only.

of the discounted value of costs of education.³ An alternative method of computing the rate of return to education is to regress the natural logarithm of earnings on schooling. The resulting coefficient of schooling is interpreted as the rate of return.⁴ Thus, the rate of return to education can be computed by either direct comparisons of earnings profiles and costs of education or the regression method.⁵ Almost all researchers in the Indian context mentioned above, with the exception of Panchamukhi and Panchamukhi (1969), followed the former method. However, there are differences in the types of adjustments and assumptions made, besides differences in sources of data, coverage, reference period, etc.

In the following section, all the important studies are briefly described along with a critical appraisal of these studies highlighting the differences in their methodologies and results obtained. This is followed by a summary of their conclusions and policy implications along with some general concluding observations about the theoretical and empirical problems in this context.

AN APPRAISAL OF THE RATE OF RETURN STUDIES

Several studies on the rates of return to Indian education did not yield uniform results, even though some broad general conclusions could be deduced. The differences in results could be explained in terms of the differences in the coverage of each study, the reference period, the nature and size of data and more importantly differences in the methodological aspects.

Scope and Coverage

Of the several studies, only the study by Pandit is based on an all-India sample, while the others were either micro-studies or

³ Chapter 5 presents a comprehensive discussion on the method of computing the internal rate of return to education, various concepts and types of rates of return, the problems involved, the adjustments required and the way they are made, etc.

⁴ The reasoning underlying this procedure is described clearly in Addison and Siebert (1979: 130-32).

⁵ In literature on the rates of return to education the former method is relatively more extensively used, including the studies by Becker (1964), Blaug (1965, 1971), Schultz (1961-b), Psacharopoulos (1969), etc. Among those who used the latter method mention should be made of Chiswick (1974) and Mincer (1974).

studies covering a section of the population. Nallagoundan, Selowsky and Blaug *et al.* restricted their studies to male workers in urban India. Harberger's study was confined to male workers in Hyderabad city while that of Chaudhri (1979) to male workers in rural areas of Punjab and Haryana. While the studies by Panchamukhi and Panchamukhi, and Kothari were based on the city survey of Greater Bombay, the study by Chaudhri and Rao covered the graduates of Delhi University and the studies by Husain referred to Ludhiana and Lucknow. The studies by Paul and Shortlidge related to specialised branches of education at two national institutes—management education at the Indian Institute of Management, Ahmedabad, and agricultural education at the Govind Ballabh Pant University, Pantnagar, respectively.

The Data

Similarly the size and source of data differ from study to study. Even when the source of data was the same, methodological differences produced different results. The National Council of Applied Economic Research Survey data formed the basis for a number of studies, namely, studies by Nallagoundan, Selowsky, Blaug *et al.*, Pandit and Goel; and the city survey of Greater Bombay was used by Kothari and Panchamukhi. But as we see, the results are not comparable in their magnitudes.

Equally important was the variation in the nature of data, which forced researchers to make several assumptions. The socio-economic survey of Hyderabad city (Indian Institute of Economics 1957), which covered a sample of 5,885 working members in the city, was the basis of the age-earnings profiles derived by Harberger. Since the survey provided only the average earnings by the level of education, it obliged Harberger to make certain assumptions about the age distribution, the age at peak earnings and the shape of the profiles, which was assumed to be relatively flat. These assumptions resulted in a wide margin of error.⁶ His estimates of the costs of education were purely hypothetical. These factors produced over-estimates, which Harberger himself deliberately opted for.⁷ This

⁶ See Blaug *et al.* (1969) who also quote W. Lee Hansen's comments from an unpublished paper.

⁷ For instance, Harberger observed: 'I had to decide whether I would aim for an under-estimate or an over-estimate of the rate of return to education, and I opted for

led Woodhall (1972: 235) to observe that 'Harberger's estimates of the rate of return to investment in Indian education are probably the least reliable.' In fact, Harberger himself admitted that his was not the most reliable data. His aim was 'to squeeze as much juice as possible out of the "lemon" ' (p. 18).

Nallagoundan used the urban income survey of 4,640 earners conducted by the National Council of Applied Economic Research (1962-a) and data on 4,000 engineers covered in another study by the Council for Scientific and Industrial Research (1967). He also made certain assumptions regarding disaggregating income between earned and unearned. In addition, he assumed equal distribution of family income for self-employment among all the family members irrespective of their educational levels. In contrast to Harberger, Kothari assumed profiles which were steeper and attained peak earnings at later ages. Like Nallagoundan, Kothari tried to eliminate the influence of business and commercial enterprises on individual earnings, which he derived from the city survey of Greater Bombay (Lakdawala *et al.* 1963) with a sample of 19,301 wage earners. He subtracted the earnings of businessmen from the total earnings of all the male earners at each educational level. He also made several assumptions about the shape of the profiles and the age at which peak earnings were reached.

Husain (1967) derived her data from the Directorate General of Employment and Training surveys and the Ministry of Education. The data covered matriculate earners of Ludhiana and post-graduate earners from an all-India sample of 6,148 earners. She assumed that the average earnings for each educational level per annum were equal to the average earnings in the seventh year after completing it. Subsequent additional earnings were assumed to be related to experience and not to education. In another study (Husain 1969), which was based on a survey conducted in Lucknow (Shrimali 1967), she made an even more unrealistic assumption that the average monthly income of the earners reported in the survey at a particular point of time was equal to the average lifetime earnings.

Blaug, Layard and Woodhall (1969) used data collected by the

an over-estimate' (p. 20). He further admitted: 'I have consciously tried to bias the assumptions in the direction that will produce high estimated rates of return to investment in education' (pp. 23-24).

National Council of Applied Economic Research (1962-a) and data collected by Ovens (1973) on 20,000 workers from four major industries in India, namely, fertilisers, heavy electricals, machine tools and consumer products. They used Nallagoundan's data extensively and supplemented it by the survey data collected by Ovens. As indicated earlier, their data included neither women nor workers in rural areas. Pandit derived the age-education earnings profiles relating to 2,203 workers from the National Council of Applied Economic Research Survey (1967-b), which he found to be representative of all-India. Goel constructed the age-earnings profiles based on two surveys of the National Council of Applied Economic Research (1962-a and-b; 1967-b).⁸ His estimates of private expenditure were based on several assumptions, which were not made explicit.

All the researchers derived data on the institutional costs of education from official sources whereas with respect to the private costs of education, various sources formed the basis. Foregone earnings of the pupils were estimated on the basis of the age-earnings profiles, which were based on the various surveys described above. Sahota's estimates of the direct costs of education formed the basis for Harberger's estimates. However, Harberger's estimates of the costs of education had been rejected as purely hypothetical. Nallagoundan and Blaug *et al.* simply assumed the private costs on the basis of limited evidence provided by a sample survey conducted by the Education Commission (1966). The estimates of Panchamukhi (1965), Kothari (1966), Khusro (1967), and Shah (1969) were extensively used by others in computing the private costs of education.

Adjustments

The methodological differences particularly with respect to the number and magnitude of adjustment factors that were taken into account are of crucial importance in understanding the differences in the final estimates.

⁸ In fact, Goel's study was not an in-depth study on the rate of return to education. He observed that opportunity costs constitute a major part of the total costs of education and should be taken into consideration in any analysis of costs and benefits of education, but it was not clear whether he included them or not.

TABLE 4.1 Comparison of Age-Education Earnings Profiles in India

	Hyderabad Survey as Assumed by Harberger	Bombay Survey	Urban- India Survey	Fertilizer Industry	Heavy Elec- trical Factory	Machine Tools Factory	Consumer Products Factory	Consumer Expenditure Survey
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I. Completed Primary								
(a) Age at peak earnings	30	—	42	—	42	—	52	37
(b) Peak earnings (monthly) Rs.	127	—	161	—	226	—	543	139
(c) Average lifetime earnings (monthly) Rs.	114	—	103	—	154	—	339	84
(d) Ratio of (b) to (c)	1.11	—	1.56	—	1.47	—	1.60	1.65
II. Completed Secondary								
(a) Age at peak earnings	35	41	47	47	57	57	57	57
(b) Peak earnings (monthly) Rs.	213	450	278	476	600	500	1038	365
(c) Average lifetime earnings (monthly) Rs.	188	320	208	322	359	325	708	204
(d) Ratio of (b) to (c)	1.13	1.41	1.34	1.47	1.67	1.54	1.47	1.79
III. Graduates								
(a) Age at peak earnings	40	50	52	52	52	57	47	42
(b) Peak earnings (monthly) Rs.	736	840	450	819	792	969	1350	452
(c) Average lifetime earnings (monthly) Rs.	612	569	350	554	521	533	1003	269
(d) Ratio of (b) to (c)	1.20	1.48	1.29	1.48	1.52	1.82	1.35	1.68

IV. *Relative Earnings* (ratio of

average lifetime earnings)

(a) Matriculation over primary	1.6	—	2.0	—	2.3	—	2.1	2.4
(b) Graduates over matriculates	3.2	1.8	1.7	1.7	1.5	1.7	1.4	1.3
(c) Graduates over primary	5.4	—	3.3	—	3.3	—	3.0	3.2
(d) Professional graduates over general graduates	—	2.0	2.2	1.8	2.2	1.7	—	1.2

— Not available.

Sources: Kothari (1967-b), Blaug *et al.* (1969) and Pandit (1972).

Adjustment for Ability: All the earnings differentials cannot be attributed to education. Even though Harberger recognised that 'natural abilities certainly explain part of the extra earnings of more highly educated persons' (p. 29), he did not attempt any correction for this factor. On the other hand, such an attempt was made by Nallagoundan, Blaug *et al.*, Pandit and Goel, whereas others completely ignored this factor. In other words, they implicitly assumed that education alone could explain earnings differentials, i.e., the alpha coefficient⁹ was 1.0. While Nallagoundan and Shortlidge assumed an alpha coefficient of 0.5 and 0.6 respectively, Blaug *et al.* and Pandit estimated three sets of rates of return making three alternative assumptions about the value of alpha coefficient: 0.5, 0.65 and 1.0. However, the estimates based on the assumption of an alpha coefficient of 0.65 were used for purposes of analysis. Interestingly, Goel made an adjustment for ability assuming different values of the alpha coefficient for different levels of education—0.9 for school level (primary, middle and secondary), 0.7 for degree level and 0.6 for post-graduate level.¹⁰

Adjustment for Economic Growth: This growth factor received the attention of very few researchers. Nallagoundan recognised the importance of this factor but did not make any adjustment for it. Harberger also ignored this factor. While Blaug *et al.* and Goel assumed a secular long-term growth rate of 2 per cent, Pandit suspected it to be on the higher side and accordingly assumed a rate of 1.5 per cent, based on long-term economic growth in India between 1860 and 1962.

Adjustment for Unemployment: While adjustment for unemployment, Harberger assumed an unemployment rate of 6 per cent for primary school leavers, and 100 per cent unemployment rate for others—an assumption not altogether reasonable. Based on the

⁹ See Chapter 5, Section on the Estimation of the Internal Rate of Return.

¹⁰ While the debate on the adjustment for ability itself is inconclusive (see Blaug 1976 and Psacharopoulos 1975 for a summary of the debate; see also Tilak 1981-a), the issue of assigning decreasing values of the alpha coefficient for increasing levels of education is yet to be studied in depth. However, it is interesting to compare Goel's alpha coefficients with Morgan and David (1963) and Becker (1964) who arrived at a reverse pattern of alpha coefficients: 0.4 for primary and 1.0 for graduate level. See Psacharopoulos (1975: 28–29) for more details.

Directorate General of Employment and Training surveys. Husain assumed an unemployment rate of 13 per cent for matriculates and graduates, 7 per cent for post-graduates and zero for professional graduates. Blaug *et al.* assumed a waiting period of 16 months for matriculates and 6 months for graduates. On the other hand, Pandit's estimates of the unemployment period (based on the National Sample Survey data) were 12 months for primary, 14 months for matriculates and 11 months for higher educated. However, unlike Blaug *et al.*, Pandit assumed that this unemployment period was distributed throughout the working life of the labour force—an assumption that cannot be granted without reservations. Though they recognised the problem of unemployment, neither Nallagoundan nor Kothari took this factor into consideration.

Adjustment for Non-Participation in the Labour Force: None of the researchers except Pandit adjusted the rates of return for non-participation in the labour force. Pandit made this adjustment only in the age group of 35–59 and assumed 100 per cent participation in the age group of 15–34, an assumption that cannot be fully justified. This factor was not important in other studies (namely, Harberger, Nallagoundan, Selowsky and Blaug *et al.*) as they were confined to male labourers in urban areas, among whom the non-participation rate was very low. On the other hand, Pandit corrected for this factor as his sample included women as well whose non-participation rate was alarmingly high. (See Chapter 6, and Statistical Appendix, Table 6.2.)

Adjustment for Mortality: Nallagoundan, Harberger, Blaug *et al.*, etc., did not take the mortality factor into consideration. Kothari used the general life-tables for this purpose and adjusted the rates of return for graduates which resulted in a decrease in the rate by 2, on the basis of which he predicted that this would be the same for other levels of education. Husain also used the general life-tables available for males for this purpose. But the use of general rates, instead of death rates specified by educational levels which may yield lower rates than the general tables, was believed to have produced a serious error in the estimates (Pandit 1976: 53). Accordingly, Pandit used the data provided by the Life Insurance Corporation of India

TABLE 4.2 Methodological Aspects of Studies on Returns to Education in India

Author	Harberger (1965)	Nalla- goundam (1965)	Selowsky (1967)	Kothari (1967-b)	Husain (1967)	Blaug <i>et al.</i> (1969)	Panchu- mukhis (1969)	Pandit (1972)	Goel (1975)	Chaudhri (1979)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Reference period	1957	1960-61	1960-61	1965-66	1950-54	1960-61	1955-56	1964-65	1967-68	1961
Coverage	Hyderabad	Urban India	Urban India	Greater Bombay	India	Urban India	Greater Bombay	All India	All India	Rural Punjab & Haryana
Data sources	IIE (1957)	NCAER (1962), CSIR (1961)	NCAER (1962), CSIR (1961)	Lakdawala <i>et al.</i> (1963)	DGET	NCAER (1962), Owen (1973)	Lakdawala <i>et al.</i> (1963)	NCAER (1967)	NCAER (1962), (1967)	Village surveys AERC, DI (1938)
Sample size	2895	8650	8650	10301	6148	28650	33859	2205		(households)
<i>Types of rates</i>										
Social	x	x	x	x	x	x	x	x	x	x
Private	—	x	—	x	x	x	—	x	x	x
Marginal	x	x	x	x	—	x	x	x	—	—
Average	—	x	x	—	x	x	—	x	—	—
Present values	—	—	—	—	—	—	—	x	—	—
Sex										
Males	x	x	x	—	—	x	—	—	—	x
Females	—	—	—	—	—	—	—	—	—	—
Males and Females	—	—	—	x	x	—	x	x	—	—

for this purpose, which he found to be more relevant in the context of educated persons. Generally, it was believed that mortality rates would not affect the rates of return to education significantly.¹¹ Perhaps this was the reason why others ignored this factor completely.

Adjustment for Wastage and Stagnation: With respect to wastage and stagnation in education all the major studies except Nallagoundan's took this into consideration. While Harberger adjusted the earnings stream for this factor, others adjusted the cost stream.

Estimates of Rates of Return

Harberger estimated only the social rates of return to additional schooling. His estimate for secondary education as compared to the primary level was 11.9 per cent while it was 16.9 per cent for higher education as compared to the secondary level. Nallagoundan estimated both social and private rates of return. The social rates of return obtained were 17 per cent for primary education, 12 per cent for middle level, 10 per cent for matriculation, 7 per cent for first degree (arts and science), and 10 per cent for engineering education. When Selowsky recomputed the social rates of return, originally estimated by Nallagoundan, altering the assumption of the alpha coefficient (1.0 instead of 0.5), the rates of return were not doubled. They were only 40–50 per cent higher than Nallagoundan's estimates. According to Kothari, the social rates of return were 20 per cent to secondary, 10 per cent to higher (general), and 22 per cent to higher (professional) as compared to the private rates of education: 14 per cent to higher (general) and 25 per cent to higher (professional) levels.

Husain arrived at an average social rate of 37 per cent to secondary education, 4 per cent to first degree (general), and 3 per cent to post-graduate education. She attributed the lower rates of return to higher education to higher indirect costs at those levels of education. Blaug *et al.* and Pandit estimated social marginal, social average, private marginal and private average rates of return and, as indicated earlier, they made several adjustments. The adjusted social rates as estimated by Blaug *et al.* ranged from 15.2 per cent to primary education over illiteracy to 8.9 per cent to first degree over

¹¹ For instance, see Hines *et al.* (1970).

TABLE 4.3 Estimates of Rates of Return to Investment in Education in India

(per cent)

Educational Level	Harberger	Nalla- goundan	Selowsky	Kothari	Husain	Blaug <i>et al.</i>	Pandit	Goel
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Social Rates of Return</i>								
Literacy	—	15.9c	23.5c	—	—	—	7.60e	—
Primary	—	17.0	23.5	—	—	15.2	—	10.1g
Middle	—	11.8	17.7	—	—	14.2	14.00	9.9
Secondary	11.9a	10.3	16.4	20.0	37.0	10.5	5.00f	5.0
Intermediate	—	—	—	—	—	—	5.00f	—
I degree (general)	—	7.0	11.6	10.0	4.0	8.9	5.00f	4.8
II degree (general)	16.9b	—	14.7	—	3.0	—	5.00f	8.6
Higher (professional)	—	9.8	—	22.0	3.0	12.5	5.00f	—
<i>Private Rates of Return</i>								
Literacy	—	30.0c	—	—	—	—	9.45e	—
Primary	—	23.0	—	—	—	18.7	—	10.4g
Middle	—	13.0	—	—	—	16.1	17.32	10.1
Secondary	—	10.0	—	—	48.0	11.9	5.00f	6.0
Intermediate	—	—	—	—	—	—	5.20	—
I degree (general)	—	8.1	—	14.0d	12.0	10.4	9.21	6.4
II degree (general)	—	—	—	—	10.0	—	6.73	11.7
Higher (professional)	—	13.5	—	25.0	9.0	15.5	5.62	—

Note: a - Secondary over primary e - incomplete elementary education

b - Graduate/post-graduate over secondary f - less than 5 per cent

c - 2 years schooling g - over illiterates

d - all types — not estimated

Sources: Harberger (1965), Nallagoundan (1967), Selowsky (1967), Kothari (1967-b), Husain (1967), Blaug *et al.* (1969), Panchamukhi and Panchamukhi (1969), Pandit (1972), Goel (1975), and Chaudhri (1979).

matriculation and the corresponding private rates of return were 18.7 per cent and 10.4 per cent respectively. In contrast, Pandit's estimates were very low. While the social rate of return to primary education was half of the estimate of Blaug *et al.*, to middle level education it was about the same, whereas to secondary and higher levels of education the rates of return were less than 5 per cent. This may be due to more adjustments made by Pandit. However, the private rates were slightly higher than the social rates. He also estimated the net present values at 6 per cent (social) and 8 per cent (private) rates of discount. Thus, while the estimates of Nallagoundan, Selowsky and Blaug *et al.* follow a consistent pattern of decreasing returns to increasing levels of education, Pandit's estimates do not strictly conform to this pattern. Goel's results also fall in the majority pattern (with the exception of the returns to post-graduate education), but this may be due to the nature of ability adjustment he introduced.

Alternative Rate of Return

All the researchers compared their estimates with one alternative rate of return or other. What, in fact, is the alternative rate of return for comparison? It can be defined as that rate of yield of investment made in the best (or average) sector other than the present one. Choosing the correct alternative rate of return is very important and at the same time very difficult. Sometimes the interest rate is considered as the alternative rate of return. But the interest rate generally varies over a wide range, particularly in an economy like India, where the unorganised money market is considerably large in size. The interest rate may be 4-8 per cent generally earned on post office, commercial banks savings or government bonds, stocks, etc. It may be between 12 to 20 per cent on loans given by commercial banks, and it may range from 20 per cent to say 200 per cent on loans given by private money-lenders. What, therefore, should be chosen as the right private rate of alternative return?

The social alternative rate of return is equally difficult to choose. In many cases it is computed on the basis of yield in the industrial sector. There is no reason why it should not be based, particularly in an agrarian economy like India, on investment-output relations in the agricultural sector. Further, while evaluating investment in

education, can the same alternative rate of return be used as the rate used in the context of evaluating physical capital industries?

We do not have satisfactory answers to all these questions. But the alternative rate of return is a very crucial parameter because it tells us about the desirability of investment in a particular level of education at the margin. Like the rate of discount, higher the alternative rate of return, weaker is the argument in favour of the project, because if the estimated rate of return to a project in education is less than the alternative rate of return, one argues for a reallocation of resources away from that specific level of education. The final decision regarding investment in education is highly sensitive to the alternative rate of return.

Yet, there is little consensus among economists as to what the alternative rate of return should be. Among the researchers whose studies have been reviewed here, Harberger is one who estimated the alternative rates of return. Based on 1,001 companies in the modern industrial sector in India in 1955-59, he estimated the rates of return to investment in physical capital which varied from 13 to 26 per cent depending upon the assumptions made. Even though several studies on the productivity of physical capital in India arrived at a rate with a wide range,¹² Blaug *et al.* used 8 per cent and 12.5 per cent respectively for private and social alternative rates of return, assuming a social time preference rate of 5 per cent.¹³ All the other researchers compared their estimates of rates of return to education to either of these two sets of alternative rates and their conclusions have already been discussed in detail.

¹² Minhas' (1963) estimates were in the range of 7 to 34 per cent. Datta-Chaudhuri and Sen (1970) used an alternative rate of return of 20 per cent. Mishra and Beyer's (1976) estimates for a fisheries project range from 17 to 26 per cent.

¹³ The discount rate (s) is estimated as follows (Blaug *et al.* 1969: 24-25):

$$s = a \bar{r} + (1 - \theta) \bar{r}$$

where

$$a = \frac{\rho}{\bar{r}} + (1 - \theta)$$

where ρ is the social opportunity cost of capital; \bar{r} is the rate of social time preference; θ is the proportion of outlays displacing private investment.

A Brief Description of Other Studies

Panchamukhi and Panchamukhi (1969) made an interesting analysis using the survey data of Greater Bombay (Lakdawala *et al.* 1963). Grouping the data into 47 socio-economic factors (10 education groups, 9 industry groups, 9 occupation groups, 3 employment status variables, 8 family income groups, 6 age groups and 2 sex groups) they found that only 17 per cent of the variance in earnings could be explained by these factors. Using the coefficients of marginal contribution, the annual returns to education were derived and the ratio of these returns to direct costs was worked out, which was taken to be the rate of return to education. Their estimates of returns were 21.37 per cent to secondary education, 7.41 per cent to undergraduate diploma, 6.73 per cent to first degree (arts and science), and to post-graduate level the returns were in the range of 1.4 to 8.6 per cent varying with every course.

Chaudhri and Rao (1970) attempted a case study of graduates of Delhi University. Using the earnings data relating to 1954 graduates of the University (Ministry of Labour and Employment 1962) and data on the costs of education from another study (Khusro 1967), Chaudhri and Rao estimated the marginal private and social rates of return to higher education with alternative assumptions about foregone earnings. They concluded that the demand for higher education reflected the 'pressure for a slice in the higher subsidy' at the higher level.

Samuel Paul (1972) applied the cost-benefit analysis to a specialised branch of education, viz., management education. Evaluating the two-year post-graduate programme of the Indian Institute of Management, Ahmedabad, he found that even at a rate of discount of 13 per cent, the programme at the Institute yields a positive social net present value. Through a combination of import substitution and income creation approaches, he made as many as 32 estimates of the social net present value on the basis of alternative assumptions regarding the rate of discount, the alpha coefficient, foreign exchange, elasticity of demand for management education, etc.

Shortlidge in his doctoral dissertation in 1973¹⁴ applied this

¹⁴ A condensed version of this study took the form of an occasional paper (Shortlidge 1974-b). References made here refer to the latter paper only.

technique to yet another specialised branch of education—agricultural education at the Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, and calculated private as well as social returns to agricultural education. Shortlidge (1974-a and 1975) also computed the rates of return to university training for *gram sevaks vis-a-vis* the three-year agricultural degree level education. The average social rates of return under alternative assumptions were in the range of 8.3 to 13.5 per cent to the *gram sevak* training programme as compared to 9.9 to 10.3 per cent to regular agricultural graduates. In doing so, he made adjustments for mortality and ability and the alpha coefficient assumed was 0.6.

Chaudhri (1979) estimated the returns to rural education in Punjab and Haryana, and found extremely high rates of return. Using data on 1,038 households in nineteen villages of Punjab and Haryana, collected by the Agricultural Economics Research Centre of the University of Delhi through its continuous village surveys, the costs of education estimated by others (Education Commission 1966; Nallagoundan 1967) and considering the direct, indirect and innovative effects of education, Chaudhri found 71 per cent private rate of return and 55 per cent social rate of return to secondary education. Taking only the direct and indirect benefits, his estimates for private and social rates of return to primary education were 435 per cent and 90 per cent respectively. He made no attempt to make adjustment for any other factor, though he took the mortality factor into consideration while assessing the length of the working life.

Venkatasubramanian (1980) estimated both private and social rates of return to primary and middle levels of education in Tamil Nadu. Based on the National Sample Survey data relating to 1970–71 on earnings, he estimated that primary education yields a private rate of return of 39.6 per cent over illiterates, and a social rate of return of 22.4 per cent, while middle level of education yields a private rate of return of 14.2 per cent and a social rate of 11.1 per cent. He made no attempt to adjust these rates for any factor.

CONCLUSIONS AND POLICY IMPLICATIONS

Harberger compared his estimates of rates of return to education with the estimates of marginal productivity of physical capital in

industries and concluded that investment in education in India was not as productive as it was in the modern industrial sector. However, he did not suggest reallocation of investment in favour of physical capital, but called for efforts to raise productivity of investment in education. In fact he regarded his study as 'suggesting future research rather than as indicating particular alterations of existing investment patterns' (p. 33). His analysis ended up more in terms of decisions for improvement within education. Nallagoundan's conclusions were similar to those of Harberger. Unlike Harberger, he argued for reallocation of resources in favour of physical capital, as according to him, more investment in education may not contribute to economic growth. Kothari used his estimates mainly to provide an explanation for the great rush for admission to engineering courses. The rate of return accruing to engineering education was quite high—22 per cent. The inverse relationship between the estimated rates of return and the levels of education allowed Blaug and his associates to recommend reallocation of resources within the educational sector in favour of lower levels of education and higher professional education. They did not favour any redistribution of resources away from education to physical capital formation. In fact, the major objective of their study was to provide an explanation for the persistence of educated unemployment. Pandit also arrived at similar conclusions. He found that from a social point of view, investment in primary and middle levels of education was fully justified and poor returns to higher education suggested the necessity of reducing costs, improving the quality and linking it with on-the-job-training. He did not suggest transfer of resources away from education, as it was not possible to quantify several externalities linked with education.

Since the various studies reviewed here are based on different surveys and follow different procedures of computations with varying assumptions and adjustments, the estimates are not comparable. However, irrespective of the quantitative differences in their rates of return estimates, the general conclusions which emerge from these studies are:

1. Investment in education in India is not as profitable as investment in physical capital. However, except Nallagoundan, all the researchers favoured reducing the costs of education and making it more productive within the sector.

2. Even though the returns to educational investments are lower than the returns to investment in physical capital, the rates are positive at all levels, indicating that investment in education is not an altogether uneconomic choice.
3. The high private rates of return compared to the social rates lead us to the erroneous conclusion that investment in education is privately more efficient. This is misleading because of our ignorance of several externalities of education, which if quantified, would push the social rates of return much above the estimated rates.¹⁵
4. Rates of return generally decline as one moves from the lower levels of education to higher levels. The returns to primary education are quite high; the returns to secondary school education are fairly good; and the returns to college education are rather low. Thus, all the studies underline the criticism that 'Indian education is heavy at the top and weak at the bottom' (Nallagoundan 1967: 367). This is primarily because the resource allocation policy favours relatively higher education, as in most other more or less developed capitalist countries.¹⁶ More and more investment at a given level of education pushes down the returns to that level of education. Accordingly, there is a strong case for diversion of resources from higher levels to lower levels of education.
5. The various studies provided deep insight into a number of issues. For example, the studies showed that educated unemployment, though important, would not affect the internal rate of return so seriously as was feared. Second, it was also evident that wastage and stagnation in education was very important causing a substantial fall in the rates of return and that if the rate of return to drop-outs was substantial, an assumption which was not widely accepted, the 'true' rate of return would be very high. Last, the alpha coefficient reduces the rate of return less than proportionately.
6. In spite of conceptual and data limitations, as Kothari and Panchamukhi (1980: 190) observed, the rate of return studies resulted in two distinct advantages: (a) the studies implicitly

¹⁵ For instance, see the modest attempt made by Chaudhri (1979).

¹⁶ See Bowles (1971), Bhagwati (1973) and Carnoy *et al.* (1982) for more interesting details on this issue. See also Tilak (1982-b).

emphasise the need to recognise educational planning as part of overall planning of allocation of resources, or educational planning has to be consistent with economic planning; and (b) these studies also implicitly stress the need for the decision-making process in education to be based on more relevant information rather than on intuitions. Further, the various research studies proved that despite severe data limitations and imperfections in the labour market, the application of cost-benefit analysis to educational planning is not only feasible in developing countries like India,¹⁷ but it also provides answers to several problems related to educational planning.¹⁸ However, unfortunately the rate of return is not being used as an effective instrument in investment allocation policies in education in India.¹⁹

All the research studies reviewed in this chapter, however, suffer from one major drawback apart from several data and conceptual limitations as already described. This drawback is that in none of these studies any attempt has been made to estimate and analyse the rates of return at disaggregate levels, i.e., for different socio-economic groups. Further, certain groups like women were consciously excluded in most of the studies discussed, not to speak of studying the returns accruing to women's education separately.²⁰

Since education, earnings and related aspects like unemployment, participation in the labour force, etc., depend upon the basic income

¹⁷ The excellent example is the study by Harberger.

¹⁸ For example, the study by Blaug *et al.* provides an explanation for the persistence of educated unemployment; Kothari's study explains the rush for admission to engineering education, and all studies in general to allocation problems.

¹⁹ See Tilak (1982-b) for an exercise with cross-country data which yields similar conclusions.

²⁰ Perhaps it is a global feature and it led Schultz (1971: 196) to observe:

If one were to judge from the work that is being done, the conclusion would be that human capital is the unique property of the male population Despite all of the schooling of females and other expenditures on them, they appear to be of no account in the accounting of human capital.

Schultz referred to this as a 'troublesome omission' (p. 201).

and asset-class structure and status structure in society, it may be significant to study the problem and compute the rates of return separately for each socio-economic class or group with a view to studying the appropriateness of educational investment allocations.²¹

The Internal Rate of Return: The Methodology

INTRODUCTION

Of the several important investment decision criteria such as the Net Present Value (NPV), the Benefit-Cost Ratio (BCR) and the Internal Rate of Return (IRR) which have their own relative advantages and weaknesses,¹ the IRR has been extensively used in the field of economics of education.² The general problem with the IRR is that it may not be unique. But it has been shown that in the field of economics of education where the sign of net flow of benefit stream does not change very often, multiple rates of return rarely occur.³

Further, the major problem of finding the appropriate social rate of discount⁴ is by-passed, if one adopts the IRR criterion, even though when the projects have been ordered according to their

¹ An exhaustive survey of these various decision criteria can be found in many books on project evaluation. Among the several important works reference should be made to Dasgupta and Pearce (1972), Marglin (1967), Bailey (1959), Kahn (1951), Eckstein (1961), Sassone and Schaffer (1978), Ramsey (1970), etc.

² Out of the fifty-three studies Psacharopoulos (1973) reviewed, twenty-eight were in terms of IRR, fifteen presented both NPV and IRR and only five were exclusively in terms of NPV.

³ Multiple rates of return occur specifically when the net benefit stream moves in a zig-zag way with positive and negative values, which happen in sectors like railways. Research in economics of education so far did not produce even a single case of multiple rates of return. Jean (1969) demonstrated that only in special cases the IRR takes multiple values.

⁴ See, for example, Hancock and Richardson (1985).

IRR, for a given amount of investment the problem of cut-off line remains unresolved, if there is no exogenously given preference or alternative rate of interest or rate of return. But such problems arise with other criteria as well.

We will now turn to a discussion of the method of internal rate of return followed in our study in estimating the rates of return to education at the regional level. We will also compare our method whenever necessary with the method adopted by others.

INTERNAL RATE OF RETURN (IRR): THE METHOD

The IRR to education is defined as that rate of discount which equates the sum of the present value of benefits to the sum of the present value of costs of education. Symbolically, the IRR, r^* , is determined by the following equation:

$$\sum_{t=s}^n \left[(B_t - C_t) / (1 + r^*)^t \right] = 0 \quad (5.1)$$

where B represents benefits, C the costs of education, t the time period ranging from s (the age at which education of the concerned level commences) to n (the age of retirement), $(n-s)$ being the working life of the individual including schooling years and r^* is the internal rate of return. Investment at a given level of education is considered worthwhile, if the IRR is greater than the given alternative rate of return. In practice, the IRR is found through an iterative computation process, calculating the net present value of benefits (NPV) at increasing values of r^* . The process is repeated until one arrives at a value of r^* , for which NPV becomes zero.⁵

Benefits of Education: Age-Earnings Profiles

The benefits of education are innumerable, some of these cannot be meaningfully quantified.⁶ Ordinarily only the direct monetary

⁵ Alternatively, one can use the graphic method which involves plotting the present values of benefits and costs of education at various rates of discount. The rate corresponding to the point of intersection of the benefit and cost curves gives us the value of IRR.

⁶ For a full list of benefits, see Weisbrod (1962 and 1964), Hirsch *et al.* (1964), Blaug (1965), Peacock and Wiseman (1968), and Bowman (1962). See also Davis

benefits associated with education are brought into the cost-benefit calculus primarily due to measurement problems. For this purpose the construction of the age-education earnings profiles is of primary importance. In India, as in the case of most other countries, no survey useful for the construction of lifetime earnings profiles is available. Hence, the only alternative is to locate a survey which enables us to construct the age-earnings profiles by education with reference to a point of time. No such recent survey is available which may serve our purpose. It is with this in mind that we carried out a sample survey in the West Godavari District of Andhra Pradesh. On the basis of this survey, we derived the average age-earnings profiles by levels of education. Starting from the age of 8, we classified the population into twelve age groups, the last age group being 56 years and above. We assumed that children do not enter the labour force before the age of 8 and working life ends by 65 years of age. Our survey revealed a substantial proportion of people working for wages after the age of 60, therefore, the retiring age was assumed to be 65. However, the most relevant period affecting the magnitude of IRR is the first 10–15 years of benefit stream (Shortlidge 1975: 150). In addition to the age classification, data on earnings were classified into ten educational groups—from illiteracy to higher professional levels. The earnings profiles were constructed by this cross-classification, by age and educational levels. Since we ignored all the other benefits—economic and non-economic—chiefly because of difficulties in identification and measurement, it may be worth emphasising that, *ceteris paribus*, our estimates of benefits and rates of return serve as lower limits, and can even be regarded as conservative.

Costs of Education

Costs of education consist of two important components: private and institutional costs. Private cost is defined as that part of the investment in education which is incurred either by the pupil or by his parents/guardian or by both. The private costs consist of three

and Morrall (1974) and Cohn (1979). For non-monetary benefits and their measurement, see Michael (1982).

⁷ See General Appendix, Section 5.1.

major elements: (a) tuition cost; (b) non-tuition cost (maintenance cost such as expenditure on books, stationery, hostel, transport, and uniforms); and (c) opportunity cost, also known as 'foregone earnings' that would have been earned had the pupil stayed outside the school. In contrast, the institutional costs, also known as public costs consist of the following elements: (a) current cost which includes (i) expenditure on salaries and allowances of teachers, (ii) expenditure on salaries and allowances of the non-teaching staff, (iii) expenditure on scholarships, stipends, fee concessions, etc., (iv) expenditure on consumable materials, and (v) recurring expenditure on other items such as repair and maintenance of buildings, equipment; and (b) capital cost which includes (i) expenditure on construction of buildings, (ii) expenditure on equipment, and (iii) non-recurring expenditure on other items. The sum of private and public costs, net of transfers, constitutes the total social costs of education.⁸ There is some difference of opinion among economists, however, on the treatment of foregone earnings of pupils as cost.⁹ We have decided to include them in our study.

Private expenditures on education have been estimated from data collected through the primary survey. Foregone earnings have been derived on the basis of the age-earnings profiles prepared from the survey data. For example, for the II degree (general) education, the earnings of the I degree (general) graduates serve as a measure of foregone earnings. The private costs of education have then been computed as a sum total of private expenditure and foregone earnings. Data on institutional costs of education have been collected from different sources.¹⁰ The sum total of private and institutional costs, net of transfers (fees, scholarships, etc.), gives us the social costs of education. Thus, it may be noted that only the direct expenditures and foregone earnings of the pupils have been taken into account. No attempt has been made to impute any rental value for buildings and other equipment like furniture in computing the social costs.

⁸ For an elaborate taxonomy of costs of education, see Tilak (1985-a).

⁹ See, for example, Schultz (1963), Bowman (1966), and Blaug (1965), who strongly argued for the inclusion of foregone earnings in the cost stream; and Vaizey (1962), Balogh and Streeten (1963) and Merrett (1966) among those who favoured its exclusion.

¹⁰ See Chapter 3.

Estimation of the Internal Rate of Return

As stated earlier, we have estimated the internal rates of return for different groups of the sample population—men, women, backward castes, non-backward castes and the sample population as a whole for different educational levels. These rates could be crude as well as adjusted. In estimating the crude rates a number of assumptions are involved. First, it is assumed that there is no wastage in education. All the pupils who enter school go through successfully, implying thereby that the cost structure remains unaffected by drop-outs and failures. Second, the secular long-term growth in incomes is assumed to be negligible. This implies that a cross-section age-earnings profiles and lifetime earnings profiles are the same. Third, all the pupils who go through the educational system are assumed to be employed. Fourth, it is assumed that all the pupils after completing their education participate in the workforce. Fifth, the total earnings differential between graduates at two different levels of education is assumed to be due to education alone and factors such as family background and ability, do not have any role in this. Last, it is assumed that people live up to the end of their average working life period. Since none of these assumptions is realistic, a number of adjustments have to be made to the costs and/or earnings data in order to arrive at the refined or adjusted rates of return. These adjustments are briefly discussed here.

Adjustment for Ability: Since neither earnings nor earnings differences can be attributed solely to education, a substantial part of individual earnings is reasonably attributed to several other personal characteristics such as innate ability, motivation and social background, which are grouped together in literature under the heading 'ability factor'. The proportion of differential earnings attributable to education when adjusted for ability, Blaug has christened the alpha (α) coefficient.¹¹ Empirical evidence on the order of influence of the non-educational or ability factor on earnings

¹¹ The alpha coefficient is defined as the ratio of the earnings differences due to education, adjusted for ability to the unadjusted earnings differences due to education. See Psacharopoulos (1975: 22).

is not systematic.¹² In literature adjustment for ability has been made either by assuming a value for the alpha coefficient¹³ or by estimating it with the help of the multiple regression analysis using an indicator of ability as one of the explanatory variables besides education.¹⁴ But since the latter method can be adopted, only if one has large samples to deal with and sufficiently good indicators of ability, one is left with no alternative but to arbitrarily assume a certain reasonable value of the alpha coefficient in the absence of such large sample data. Further, as the influence of ability on earnings would not be the same for different groups of population,¹⁵ the idea of the order of the alpha coefficient for alternative groups under study can be had from simple linear regression coefficients of years of schooling on earnings.¹⁶

Accordingly, alpha coefficients for different groups are assumed to be in the same order as the regression coefficients.¹⁷ However, within a

¹² See Blau and Duncan (1967), Hauser (1969), Griliches (1970 and 1977), Griliches and Mason (1972), Hauser (1972), Taubman and Wales (1974), Bowles (1972), Mincer (1974), Beaton (1975), Wolfe (1973) and Morgenstern (1973) for different viewpoints. A survey of the discussion can be found in Schultz (1975), Blaug (1976), and Sahota and Rocca (1985) and an excellent review in Psacharopoulos (1975). Psacharopoulos also derives various patterns of differential alpha coefficients for different levels of education, based on others' studies.

¹³ Researchers working in the area of economics of Indian education assumed the value of α coefficient ranging between 0.5 and 1.0. Nallagoundan (1967) fixed it at 0.5; Blaug *et al.* (1969) and Pandit (1972) assumed it to be 0.5, 0.65 and 1.0; whereas Shortlidge (1974-b) assumed it to be 0.6. See Tilak (1981-a).

¹⁴ A few economists (for e.g., Blaug 1971; Hanoeh 1967; Thias and Carnoy 1972; Carnoy 1967; Hunt 1963) made use of the multiple regression analysis in this context. This is possible only if we have large samples to deal with. See Psacharopoulos (1975) for details about the methodology of both approaches.

¹⁵ Hauser (1973), for instance, found that the effect of education on earnings is higher, the higher the class background of individuals.

¹⁶ See Statistical Appendix 5.1. We are, however, aware that these coefficients may not be adequate measures of the influence of education on earnings. But in the absence of any better alternative, it is these coefficients which provide some guidance.

¹⁷ Our assumed alpha coefficients are presented in the Statistical Appendix, Table 6.1. Compare our alpha coefficients with the coefficient of 0.6 which has been used in a large number of studies in the world starting from Becker (1964) and Denison (1962). It may also be noted that the few studies conducted in low income countries (for e.g., Tunisian study by Carnoy *et al.* 1978) assert that the effect of schooling on earnings is greater here than in developed countries like the USA. Similar views have been expressed by Blaug (1965). See also Carnoy (1971).

group, the alpha coefficient is assumed to be the same for different levels of education. In this case, we are guided by the observations of Psacharopoulos (1975: 58)

Firstly, greatest part of observed earnings differentials by educational level is due to education. When all available studies are taken into account, this part is greater than it was thought before. Secondly, we cannot be conclusive on whether the value of alpha rises or falls by educational level. Hence, at this agnostic stage, one may continue to use a single alpha for all educational levels. And, of course, this value would have to be well above the 60 per cent used universally almost thus far.

He, in fact, argues that it can be as high as 86 per cent.

Adjustment for Growth in Incomes: In order to estimate the rates of return to education, we require data on lifetime earnings of individuals by age and educational levels. But time-series data on age-education earnings profiles are hardly available even in advanced countries. Most studies on the returns to education are, therefore, based on cross-sectional data collected through national or regional census or sample surveys.¹⁸ The cross-section age-earnings profiles, however, do not truly represent the lifetime earnings profiles.¹⁹ The lifetime earnings profiles are, therefore, obtained by inflating the cross-section earnings profiles by the rate of growth of individual incomes.²⁰ This adjustment is commonly known as the adjustment for economic growth.

In the context of the present study we estimated the compound rate of growth of per capita income in Andhra Pradesh.²¹ At 1960-61 constant prices, the per capita income of this state increased at

¹⁸ Rogers (1969) and Taubman and Wales (1974) are exceptions who used time-series data.

¹⁹ See Eckaus *et al.* (1974) for more details.

²⁰ The use of such a method proved to be a good approximation to actual experience. See Miller and Hornseth (1971) who examined successive age cohorts and arrived at this conclusion.

²¹ The rate of growth is estimated by fitting a semi-log equation of the form $Y = a b^t$ where Y is the per capita income at constant prices, t is the time period in years and a and b are constants to be estimated, b being defined as $1 + (r/100)$ where r is the annual rate of growth.

the rate of 0.1 per cent during the period 1960–61 to 1969–70; and 0.7 per cent during 1970–71 to 1976–77. However, during the decade, 1967–68 to 1976–77, a period more relevant, the rate of growth of per capita income was 1.5 per cent and this rate was adopted for our purpose.²² It was not possible to get any idea of the difference in the rates of growth of incomes of different groups of population. Accordingly, it was assumed that this rate of 1.5 per cent holds good for all groups of the population.

Adjustment for Wastage and Stagnation in Education: It is not certain whether all the investment made in education yields output. While one cannot help unforeseen uncertainty, uncertainty which is predictable with some measure of confidence should be brought into the cost-benefit calculus. Predictable uncertainty relates to wastage and stagnation, unemployment, non-participation in the labour force and mortality. Adjustment in the earnings and/or cost streams for these factors have been briefly discussed below. All the pupils who enter a particular level of education may not come out of it in the form of finished educational products within the 'normal' period. Some pupils may withdraw from the system before they reach a particular level of education. These drop-outs constitute wastage of educational resources from the economic point of view. Some pupils may not be able to qualify in the final examinations and as such they stagnate at the same level of education for more than the 'normal' period. Hence, it is necessary to adjust the costs of education upwards for such wastage and stagnation.

For the present study, we estimated the incidence of wastage in education following the cohort method²³ according to which if Z represents the rate of wastage due to drop-outs and stagnation and N the enrolment of pupils, then:

$$Z = \left[1 - (N_{i+k, t+k} / N_{it}) \right] \times 100 \quad (5.2)$$

²² Compare with 2 per cent and 1.5 per cent rates of growth assumed by Blaug *et al.* (1969) and Pandit (1972) respectively in the Indian context. See Chapter 4. Basically, this adjustment implicitly assumes that the earnings of individuals grow at the same rate as the per capita income, which may not be entirely true.

²³ This method has been extensively used in literature. See UNESCO (1967). Mishra and Tilak (1978) also used this method in a similar context. See also Tilak (1982-a).

where i refers to the initial grade of the given level of education, $i + k$ the final grade of the same level and t the time period (in years). We adopted this time-series cohort method to estimate the magnitude of wastage in education at primary and middle levels in the case of men, women, backward and non-backward castes and for the sample population as a whole. For the other levels of education, as data are not available in the required form, we worked out the pass ratios, that is, the ratio of the number of pupils who passed in a given final examination to those who appeared in the examination. Since such data are not available for backward and non-backward castes separately, we assumed that the ratio of wastage rates at the middle level between backward and non-backward castes, estimated through the cohort method, would continue to be the same at the other levels of education. These promotion and pass ratios have been used to arrive at the costs of education adjusted for wastage and thus the costs per 'successful' pupil have been worked out and used in estimating the rates of return to education.²⁴ The promotion and pass ratios are given in the Statistical Appendix, Table 6.1.

Adjustment for Unemployment: The age-earnings profiles constructed on the basis of cross-section data include only employed persons.²⁵ These need to be adjusted for unemployment. Adjustment for unemployment involves adjusting the earnings stream as well as the cost structure, as the foregone earnings change due to unemployment. Adjustment for unemployment may result in lower (or higher) rates of return, if the effect of adjustment on earnings is relatively higher (or lower) than the effect of adjustment on costs. In making this adjustment it is assumed that a major part of the incidence of unemployment is in the early years of working life in our society. People usually remain unemployed for some time immediately after completing their education.²⁶ Once they get into a job, the frictional unemployment in the later years of life is rather

²⁴ Some people feel that the use of cost per 'successful' pupil is not appropriate and accordingly term it as an over-biased estimate of the 'true' unit cost of education. See Kothari and Panchamukhi (1980: 187) for more details. See also Chapter 6, conclusions.

²⁵ However, if the census or sample surveys cover unemployed persons also, this adjustment is not required.

²⁶ See Tilak (1984-a) for a discussion on the relationship between education and unemployment. See also Panchamukhi (1983) and Fallon (1983).

insignificant. The average waiting period or the period of unemployment by educational levels for different groups of population under study was calculated²⁷ on basis of the data collected from the District Employment Exchange,²⁸ enabling us to adjust our rates of return for this factor.

Adjustment for Non-Participation in the Labour Force: Another factor that needs to be taken care of is the voluntary non-participation of educated persons in the labour force. Such non-participation constitutes wastage as far as investment in education is concerned, calling for an adjustment of either the earnings profiles or the costs of education. This is done generally by multiplying the age-education earnings profiles with the rates of labour force participation by age-educational levels. To make a precise adjustment in the earnings profiles, we require data on the population—workers, unemployed (seeking employment) and non-workers by age-educational levels. In the case of Andhra Pradesh data on these variables are available from the 1971 Census separately by age groups and by educational levels but not by age-educational levels. Accordingly, we made two sets of estimates of labour force participation rates, one by educational levels and the other by age groups, labour force participation being taken as the ratio of the labour force to the population (labour force being the sum of workers and unemployed²⁹) belonging to a given age group or educational level.³⁰ An examination of the significance of relationship of participation rates with relevant variables shows that participation rates are more significantly related with years of schooling than with age; and this was found to be true in all the cases—men, women and the entire population.³¹ Accordingly, we used estimates of labour force participation rates by educational levels for adjusting the earnings profiles of these three population groups.

With regard to backward and non-backward castes, available data do not permit us to estimate either general or age-specific

²⁷ See Statistical Appendix, Table 6.1.

²⁸ See Chapter 3 for a note on the data.

²⁹ If unemployed are not included in the 'labour force', the adjustment for unemployment made becomes duplication.

³⁰ See Statistical Appendix, Table 6.2.

³¹ See Statistical Appendix, Table 5.2.

participation rates. Only crude rates of participation can be estimated for these sub-groups.³² Since crude rates on *a priori* grounds underestimate the 'real' participation rates, these are converted into general rates on the assumption that the ratio between general and crude rates for the whole population would hold good for these two sub-groups as well.³³ It is these general rates that were used in making the adjustments for non-participation for backward and non-backward caste groups.³⁴

Adjustment for Mortality: Another adjustment that requires to be made is for mortality, as premature death of educated individuals results in a loss in the potential benefits of education. But this adjustment could not be made in this study for various reasons. The age-specific mortality rates by educational levels for different groups of population are required for this purpose. In the absence of such data, one could use the general age-specific mortality rates for this purpose, of course, with the probability of a wide margin of error. Educated individuals (particularly secondary level onwards) belong to a relatively higher socio-economic stratum, whose class-specific mortality can be expected to be lower than those from other strata, because of differences in the standards of living.³⁵

Failure to make this adjustment, however, is not likely to have a significant effect on our estimates of returns, unless there is high mortality among individuals in the 20–40 age group, which is not the case in the state of Andhra Pradesh. Further, assuming that education reduces mortality through increased knowledge about health, sanitation and medical care, the rates of mortality for the educated would be much less and, hence, their impact on the rates of return could be taken to be negligible.

It may be noted that the adjustments described above do not

³² See Tilak (1978-b) for details on crude, general and age-specific rates.

³³ As the general rate of labour force participation of the population as a whole is 57.71 per cent higher than their crude rate, we assume that the same ratio holds good for these two caste groups between general and crude rates. Accordingly, the crude rates are inflated by the same figure to arrive at the general rates.

³⁴ All the participation rates that we used in this study are given in Statistical Appendix, Table 6.2.

³⁵ For instance, Antonovsky (1967) rightly observed: 'the time at which one dies is related to one's class.'

effect the rates of return in the same direction. While the adjustment for economic growth raises the rates of return, all the other adjustments push them down. The magnitude of their effects depends upon the magnitude of the adjustment coefficients.³⁶

TYPES OF RATES OF RETURN

In the existing literature on the economics of education one comes across two types of rates of return, marginal and average, whether adjusted or unadjusted. These estimates are usually made both from private and social angle. The marginal rates of return, or the rates of return to additional education, are estimated by using the costs and earnings differences of people between two successive levels of education. The internal marginal rate of return, r^* , on this consideration is given by:

$$\sum_{t=s}^n \left[(B_{t_k} - B_{t_{k-1}}) / (1+r^*)^t \right] = \sum_{t=s}^n \left[(C_{t_k} - C_{t_{k-1}}) / (1+r^*)^t \right] \quad (5.3)$$

where k stands for the level of education and other notations are the same as in equation (5.1). In contrast, the average rates of return³⁷ indicate the returns to blocks of education as a whole relative to illiteracy. Thus, the equation giving the average rate of return, r^{**} , takes the form:

$$\sum_{t=s}^n \left[(B_{t_k} - B_{t_0}) / (1+r^{**})^t \right] = \sum_{t=s}^n \left[C_t / (1+r^{**})^t \right] \quad (5.4)$$

Whereas the marginal rates indicate the directions for investment at the marginal levels of education from both private and social points of view, the average rates provide information on the average contribution of a given level of education relative to illiteracy.

Besides, the rates of return are estimated from private as well as society's point of view. The private rate is estimated by considering

³⁶ It is important to bear in mind that the method of adjustment for the various factors explained above implies that various factors are linearly related to earnings.

³⁷ Selowsky (1967) prefers to call it the 'total' rate of return. It may be noted that in the average rate of return, we use a somewhat broad concept of 'marginality'.

the costs of education incurred by the individual and the benefits realised by the same individual. Earnings after tax are regarded as private benefits. While estimating the social rates of return, private and public costs of education (net of transfers) are considered together on the costs side, whereas social benefits, public plus private benefits are considered on the benefits side. Earnings before tax are taken as the social benefits of education.³⁸ These rates when computed taking private benefits and costs into consideration are useful to the decision-making process of the individuals, while when computed from the social angle, these are useful for public planning of investment in education.

A CRITIQUE

In the early 1960s the use of the concepts like 'investment', 'capital' and 'rate of return' in the field of education was severely debated. But now it is widely accepted, at least among economists, that education is an investment and educated people constitute human capital and that the rate of return to education can be estimated and meaningfully interpreted. Let us briefly recapitulate the salient features of the debate.

Specifically, the rate of return approach assumes that wages and salaries are equal to marginal productivity, or, in other words, that differences in the productivity of people are reflected in their earnings differentials, an assumption common to the whole neo-classical economics. The approach also fails to separate the influence of the ability and the socio-economic background on earnings. Some critics argue that the concept of the social rate of return is not at all appropriate in educational planning, for the social rate of return must incorporate all the external effects including political, economic and psychological benefits, some of which may sometimes be negative. The basic method of calculating benefits from cross-section data was also criticised. The thrust of the overall

³⁸ Some researchers, for e.g., Owen (1974: 171), also use the concept 'fiscal' rate of return which refers to that rate of return which is computed by considering only the public costs and non-private benefits, i.e., accruing to those other than the individual concerned.

criticism, in short, is two-fold: (a) inaccuracies in the quantification of benefits and costs and thereby in the rate of return, and (b) assumptions underlying the approach.

With regard to the problem of accuracy, one of the strong proponents of the approach, Blaug (1967-a: 266) clearly admitted that these calculations represent 'something close to maximum likelihood estimates of the average yields of additional expenditures on education'. In any case, 'they are merely a summary statistic expressing the prevailing relationship between the costs of more schooling and the earnings that may be more or less confidentially expected to result from it.' The several adjustments that we have described earlier take care of much of the criticism regarding the inaccuracies in the estimation procedure. The only criticism that still remains unanswered is about the marginal productivity hypothesis that the earnings reflect marginal productivity.³⁹ A solution to this problem is estimation of shadow prices, as a few researchers (for e.g., Psacharopoulos 1970; and Layard *et al.* 1971) have already attempted. But this does not significantly improve the results.

The rate of return analysis is admittedly static taking no account of the changes in the supply of and demand for education in the future. However, as Blaug (1967-b) contends, demand and supply vary in response to the earnings differentials in the future. If the relative earnings do not change there will not be a significant change in the demand-supply relations and thereby in the rates of return. But if relative earnings do change due to a change in the underlying structure of the economy, the investment decisions can be proved to be *ex-post* mistakes. Nevertheless, 'at any moment of time they are *ex-ante* correct' (Thurow 1974).⁴⁰

The rate of return analysis fails to capture the externalities of education and, hence, its efficiency in inter-sectoral planning is restricted. However, it is highly useful for intra-sectoral educational planning, i.e., for determining the allocation of investment resources between different levels of education.⁴¹ In the same context, it is

³⁹ See Blaug (1972-a) and also Woodhall (1985). For a discussion on the important features of benefit-cost analysis in education *versus* usual treatment, see Fields (1982).

⁴⁰ See, for a recent discussion, Psacharopoulos (1980: 88-93).

⁴¹ However, externalities may pose a problem in such cases also, only if we have reasons to know that the size of the externalities varies with the levels of education of various groups of population. But we know very little about the externalities of education, including whether they are positive or negative. See Blaug (1970: 105-14; 1972-b).

argued that the rate of return can be considered as a tool of allocative efficiency and 'it does not make any reference to the question of distributive equity'. Since this is a more relevant criticism in the context of the present study we will discuss it in more detail.

That the rate of return analysis can be advantageously used for intra-sectoral allocation of investment resources, shows that it has direct correspondence with equity aspects as well, as the distributive impact of different levels of education on the population is varied (Fields 1975).⁴² It is not true to state, as Barrios and Davies (1980: 97) argue, that in studies on the equity issue 'it is not apparent that rate of return results are used as an indicator of inequitable distribution of education and the benefits deriving from it.' Several researchers⁴³ estimated the rates of return to education by race, sex and region groups essentially keeping the equity aspects in view, and the 'insights have been greatest when the calculations have been disaggregated by race, sex and region and by occupation' (Eckaus *et al.* 1974).

In short, the rate of return approach has been found highly useful not only as a tool of allocative efficiency, but also in the context of economic equity. The approach highlights the uneven distribution of educational burden (costs) across different groups of the population and the uneven distribution of benefits of education. Further, the recent modifications in the methodology, incorporating distributional weights for benefits accruing to different groups of the population, enhance the use of the rate of return approach in the context of distributive equity.⁴⁴

To conclude, no doubt, there are certain weaknesses in the approach, some of these could be eliminated with the refinement of the methodology but a few still remain. However, these are not so serious as to destroy the validity of the rate of return concept (Barrios and Davies 1980: 92), essentially because there are certain definite crucial advantages of the rate of return analysis for policy planning in education, for proper intra-sectoral allocation of

⁴² See among many recent studies, Tilak (1986).

⁴³ To cite a few, see Hanoch (1967), Lassiter (1965), Hines *et al.* (1970), T.P. Schultz (1968), Morris and Ziderman (1971), etc.

⁴⁴ See, for e.g., Harberger (1978 and 1984). See also Murty (1980). In the present study we have not used any such weights. The use of such weights may lend further support to our results.

resources in education between different levels of education, groups of population and regions, for evolving alternative strategies of educational financing with implications for policy decisions on taxation, subsidy, scholarships, loans, fee structure, etc., for analysing the demand for education and for analysing shortages or surpluses of certain types of educated workers. In all these aspects, as Majumdar (1983: 60) admits, the primary information generated and collected by the 'conventional rate of return approach . . . would surely have to be regarded as crucial'.



Returns to Education

RATES OF RETURN

Age-Education-Earnings Profiles

Following the methodology outlined in the preceding chapter, an attempt has been made here to estimate and compare the rates of return at the regional level to various levels of education of (a) the sample population as a whole, (b) men and women, and (c) backward and non-backward castes.

The unadjusted age-specific earnings profiles by educational levels of the sample population are presented in Table 6.1 and graphically depicted in Figure 6.1. The well behaved age-education-earnings profiles are expected to have the following characteristics (Blaug *et al.* 1969: 172): (i) earnings are positively correlated with education; (ii) a profile tends to rise with age to a peak and then tends to fall until the retirement age;¹ (iii) profiles for higher educated individuals are steeper than for the less educated; and (iv) the higher the level of education, the later the age at which earnings reach their peak.

As seen from Table 6.1 and Figure 6.1 the age-education earnings profiles based on our sample largely correspond to (i) the 'well behaved' profiles, the characteristics of which have been outlined above, (ii) the profiles derived from other samples in India² and

¹ For some of the reasons underlying this general shape of the age-education earning profiles, see Taubman and Wales (1974).

² A brief sketch of the profiles derived from other samples in India is presented in Chapter 4.

TABLE 6.1 Unadjusted Average Age-Education Earnings Profiles for the Sample Population (Before Tax)

(rupees per annum)

Age Group	Educational Levels					
	E_0	E_1	E_2	E_3	E_4	E_5
8-10	218	—	—	—	—	—
11-13	238	227	300	—	—	—
14-18	493	600	830	992	1515	—
19-21	701	1000	1163	1636	1943	1995
22-25	893	1269	1525	2281	3082	4106
26-30	1050	1860	2176	3910	4392	5399
31-35	1417	1950	2491	3555	4457	5488
36-40	1185	2410	3078	4251	4930	6009
41-45	1307	3278	3609	4028	4735	6297
46-50	1363	3019	2565	3834	4360	7526
51-55	1369	1867	2486	3184	4934	5200
55+	1104	1491	2192	3457	2046	3051
All age groups	1047 (98)	1897 (63)	2330 (114)	3577 (143)	4205 (240)	5319 (96)
	E_6	E_7	E_8	E_9	All Levels	Total Number of Persons
8-10	—	—	—	—	218	(6)
11-13	—	—	—	—	249	(16)
14-18	—	—	—	—	1059	(21)
19-21	—	—	—	—	1456	(35)
22-25	4662	5848	5006	12000	3504	(96)
26-30	6567	7048	6745	10588	4851	(163)
31-35	7212	8453	7636	9707	5097	(146)
36-40	7880	11033	9456	15805	5705	(143)
41-45	9349	10260	9450	17000	5085	(124)
46-50	11250	12200	11735	16200	5171	(88)
51-55	8894	12940	10692	9500	4418	(62)
55+	5968	9828	7351	11600	2981	(66)
All age groups	7101 (118)	8934 (64)	7753 (182)	12881 (30)	4475 (966)	966

Notation: Educational levels E_0 : Illiterates (no formal schooling). E_1 : Literates (assumed to be having four years of schooling). E_2 : Primary. E_3 : Middle. E_4 : Secondary. E_5 : Intermediate/Pre-University. E_6 : I degree and above (general). E_7 : II degree and above (general). E_8 : Higher (I degree/II degree or above) general. E_9 : Higher (professional).

Note: Figures in parentheses indicate the number of persons.

(iii) the profiles encountered in other countries.³ Although the profiles of higher educational levels lie above the lower ones, there is some degree of interlocking of the profiles at other levels. This may be due to the relatively small number of observations in the sample. One can expect a large sample to produce smoother curves which do not intersect each other.⁴

Thus, highly educated persons earn more at every age than those with less education. It may also be seen that the average lifetime earnings systematically increase with an increase in the educational levels of workers. Further, the differentials grow larger and larger as one moves up the educational ladder and also with every advance in age. The age at peak earnings is 33 for illiterates, 38 for middle, 43 for literates, primary and higher professional levels, and 53 for secondary and II degree (general) level graduates. The ratio of peak earnings to the average lifetime earnings is in the range of 1.17 for secondary level graduates to 1.73 for literates.

Costs

The private expenditure on education, foregone earnings of pupils, total private costs, institutional and social costs by levels of education for the sample population as a whole are presented in Table 6.2. The total social cost of middle level education is 1.36 times higher than that of primary education, 3.29 times higher for secondary education, 6.13 times higher for intermediate, 12.24 times higher for I degree (general) level and 16.49 times higher for advanced professional education. The pyramid of the private cost structure is also more or less similar.

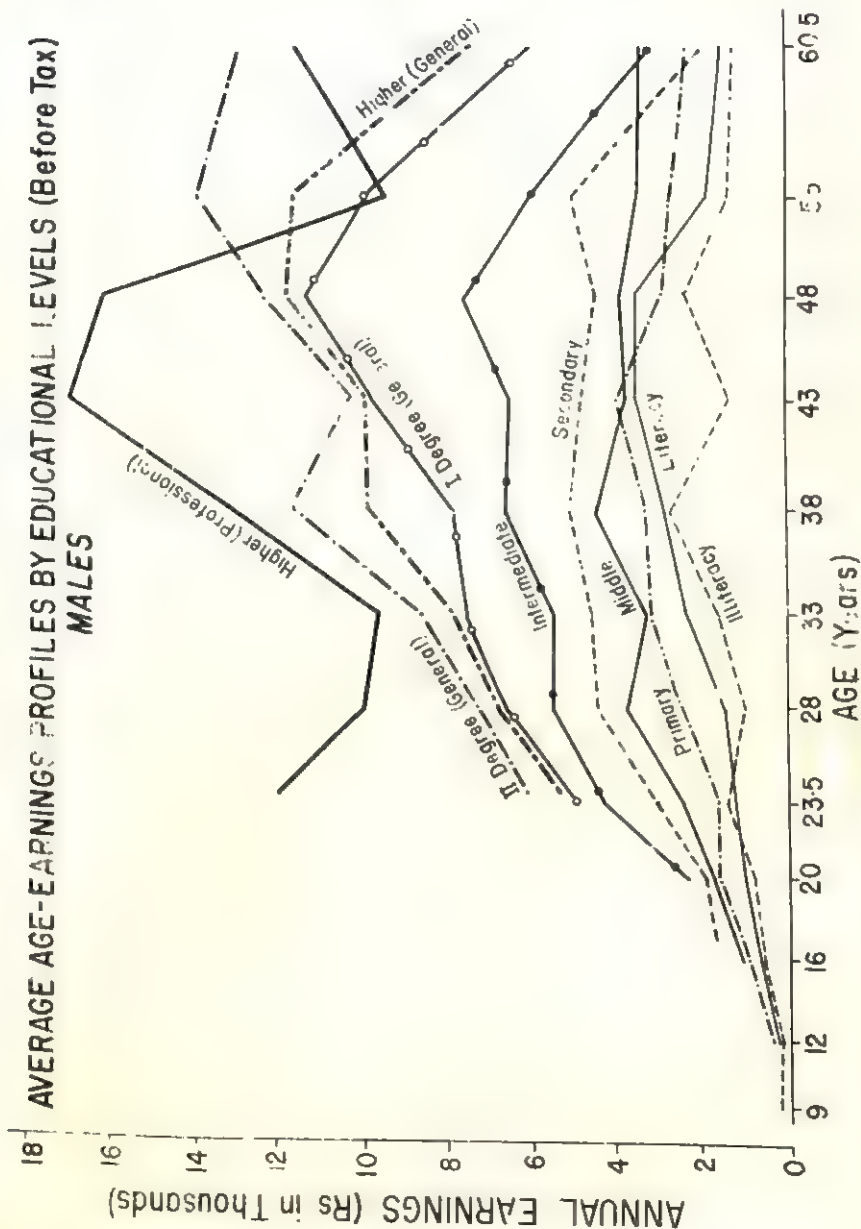
The foregone earnings form an important item in the cost structure. These are approximately 25 per cent of the social costs at the primary, 45 per cent at the middle, 60 per cent at the secondary and about 50 per cent at other levels of education, with the exception of the higher professional level at which they are just about 25 per cent.

³ For e.g., see Hansen, ed., (1967) for details about several profiles with respect to USA, UK, and Latin America; Blaug (1971) for Thailand; Thias and Carnoy (1972) for Kenya. Also see Woodhall (1985) for a summary view of several profiles.

⁴ The profiles may also intersect for a variety of factors, particularly due to the supply and demand factors. See Blaug (1967-c). But such interpretations would be meaningful, if the size of the sample is not a constraint.

AVERAGE AGE-EARNINGS PROFILES BY EDUCATIONAL LEVELS (Before Tax)

MALES



Even though the foregone earnings of the higher general and higher professional education are the same in absolute terms, as a per cent of total costs, they are less at the higher professional level because of a relatively large component of private expenditure in the total costs.

The foregone earnings constitute a higher percentage of private compared to social costs. Of the total private costs foregone earnings are a little more than 30 per cent at the primary, 69 per cent at the middle, 81 per cent at the secondary, and approximately 60 per cent at other levels of education, with the exception of the higher professional level at which they are only 35 per cent of the private costs.⁵

Contrary to the general belief, the institutional (public) cost of education forms a relatively small part of the total cost of education. Institutional costs constitute 18 per cent of the total social costs at the primary, 36 per cent at the middle, 25 per cent at the secondary, 19 per cent at the intermediate, and 15 per cent at higher levels of education. These are approximately 9 per cent at the post-graduate (general) level.

Internal Rates of Return

The age-earnings profiles and the costs of education have been used to estimate the crude rates of return for the sample population which have been, thereafter, adjusted for (i) wastage and stagnation in education, (ii) growth in incomes, (iii) unemployment, (iv) non-participation in the labour force, and (v) ability.⁶ The estimated private and social rates of return to additional years of schooling are given in Table 6.3. These marginal rates provide a measure of effectiveness of investment in education at the margin. In contrast, the average rates of return to education (Table 6.4) give the rates of yield of blocks of education as a whole. The average rates carry with them the influence of the marginal rates of various levels. The mean lifetime earnings and cost streams associated with each level of

⁵ One may doubt the magnitudes of these foregone earnings in an economy characterised by chronic unemployment among the educated. It should be noted that our figures for foregone earnings as presented here, do not take care of unemployment. However, adjustment for unemployment is done later while estimating the adjusted rates of return.

⁶ These adjustment factors are described in Chapter 5 and the magnitudes of the adjustment factors are presented in Tables 6.1 through 6.3 in the Statistical Appendix.

TABLE 6.2 Private and Social Costs of Education per Pupil per Annum

Educational Level	Private Expenditure (Rs)	Foregone Earnings (Rs)	Total Private Cost (Rs)	Institutional Cost (Rs)	Social Cost (Rs)	% of (3) in (4)	% of (3) in (6)	% of (4) in (6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Literacy	280.22	109.00	389.22	90.88	480.10	28.0	22.7	81.1
Primary	280.22	126.60	406.82	90.88	497.70	31.1	25.4	81.7
Middle	133.72	300.00	433.72	245.39	679.11	69.2	44.2	63.9
Secondary	237.60	992.00	1229.60	406.85	1636.45	80.7	60.6	75.1
Intermediate	968.57	1515.00	2483.57	570.57	3054.14	61.0	49.6	81.3
I degree (general)	1386.86	1910.00	3296.86	570.57	3867.43	57.9	49.4	85.2
II degree (general)	2060.00	3463.50	5523.50	570.57	6094.07	62.7	56.8	90.6
Higher (general)	1417.00	2531.40	4002.40	570.57	4572.97	63.2	55.4	87.5
Higher (professional)	4479.17	2366.20	6845.37	570.57	8212.57	34.6	28.8	83.4

education have been discounted at various rates of discount. Net present values, that is, the difference between the sum of the present values of earnings and costs obtained at various rates of discount, are plotted on the graph. The points of intersection of the net present values with the horizontal axis give us the internal rates of return. Figures 6.2 and 6.3 show the private and social net present value of earnings to investment in additional years of schooling and the corresponding internal rates of return.

For each educational level we, thus, have four kinds of rates of return—marginal private, marginal social, average private and average social; and for each of these we have two types of rates of return—unadjusted and adjusted. The rates of return to each level of education have been adjusted additively for the various factors described above.⁷ Before we analyse the results it would be essential to note that besides sampling bias, the adjustments made may introduce a measure of differential bias between private and social rates. For instance, the method is biased against social rates, as we consider the income-tax paid to the government as the only non-private benefit, thus ignoring all other externalities. Similarly, bias results from the use of the same foregone earnings of pupils in estimating the private and social costs and also from the adjustment for factors, such as wastage in education.

Our estimates of the private rates of return for the sample population exceed the social rates, since in India, as in most other countries, education is considerably subsidised by the government. The difference in private and social costs is much higher than the difference in respective earnings. Our estimates of the rates of return, particularly the unadjusted rates, conform to the general pattern, that is, the rates decline, as one moves up the educational ladder. For instance, while the marginal social rate of return to primary education is 29 per cent, it is just about 8 per cent to higher general education. The corresponding private rates are 33 and 9 per cent respectively. Even though such large differences are not observed in the case of average rates, still the average rates show a declining trend with an increase in educational levels.

When adjusted for wastage in education, the rates of return sharply declined. The social rate of return to secondary level education

⁷ The rates of return to higher professional education could not be adjusted for any of these factors due to the unavailability of required data.

TABLE 6.3 Marginal Rates of Return to Education

(per cent)

	R_0	R_1	R_2	R_3	R_4	R_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Private						
Literacy-illiteracy	13.38	7.93	9.69	9.51	5.41	4.14
Primary-literacy	33.43	15.11	16.83	16.05	9.94	7.82
Middle-primary	25.00	19.51	21.44	19.11	10.59	8.54
Secondary-middle	19.83	2.78	4.39	2.92	-ve	-ve
Inter-secondary	14.01	3.51	5.07	4.89	3.87	2.40
I degree (general)- inter	13.19	9.54	11.28	9.72	8.56	6.82
II degree (general)- I degree (general)	11.52	10.61	12.34	10.05	8.93	7.24
Higher (general)- inter	9.03	5.95	7.73	7.39	6.32	4.74
Higher (professional)- inter	14.93	..	..	..	..	..
B. Social						
Literacy-illiteracy	12.13	7.00	8.82	8.72	4.75	3.55
Primary-literacy	29.29	13.30	15.91	15.08	9.36	7.04
Middle-primary	19.80	15.16	21.60	19.73	8.02	6.26
Secondary-middle	15.66	-ve	3.34	1.94	-ve	-ve
Inter-secondary	12.19	2.56	4.93	4.80	2.98	1.60
I degree (general)- inter	10.80	7.84	9.56	9.13	7.95	6.29
II degree (general)- I degree (general)	10.33	8.87	9.34	8.34	8.27	7.21
Higher (general)- inter	8.48	5.55	7.48	7.29	6.17	4.56
Higher (professional)- inter	12.54	..	..	..	..	..

Note: -ve Net present value is negative.
Not estimated.

Notation: Rates of Return: R_0 : Unadjusted; R_1 : Adjusted for wastage in education; R_2 : Adjusted for wastage and growth in incomes; R_3 : Adjusted for wastage, growth in incomes and unemployment; R_4 : Adjusted for wastage, growth in incomes, unemployment and non-participation in the labour force; R_5 : Adjusted for wastage, growth in incomes, unemployment, non-participation and ability.

Fig.6.2

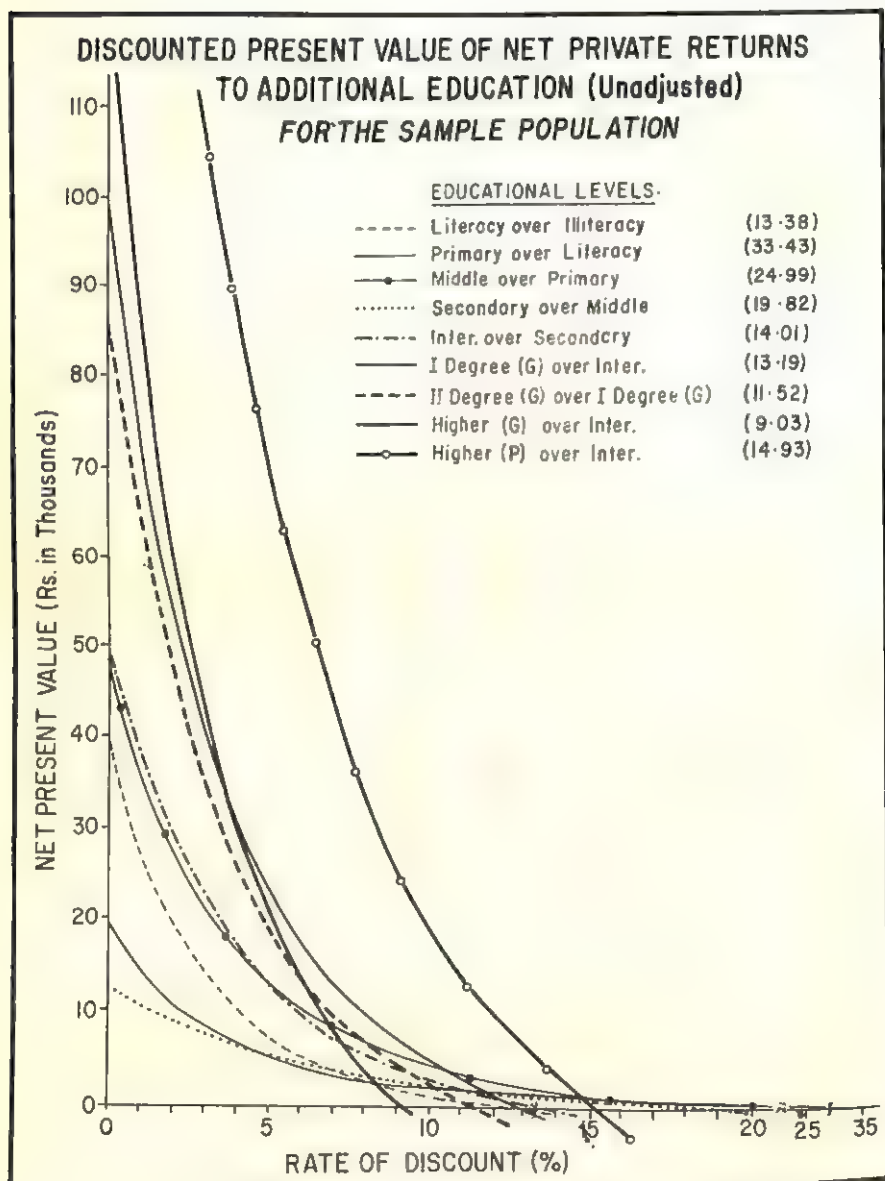


Fig. 6.3

DISCOUNTED PRESENT VALUE OF NET SOCIAL RETURNS TO ADDITIONAL EDUCATION (Unadjusted) FOR THE SAMPLE POPULATION

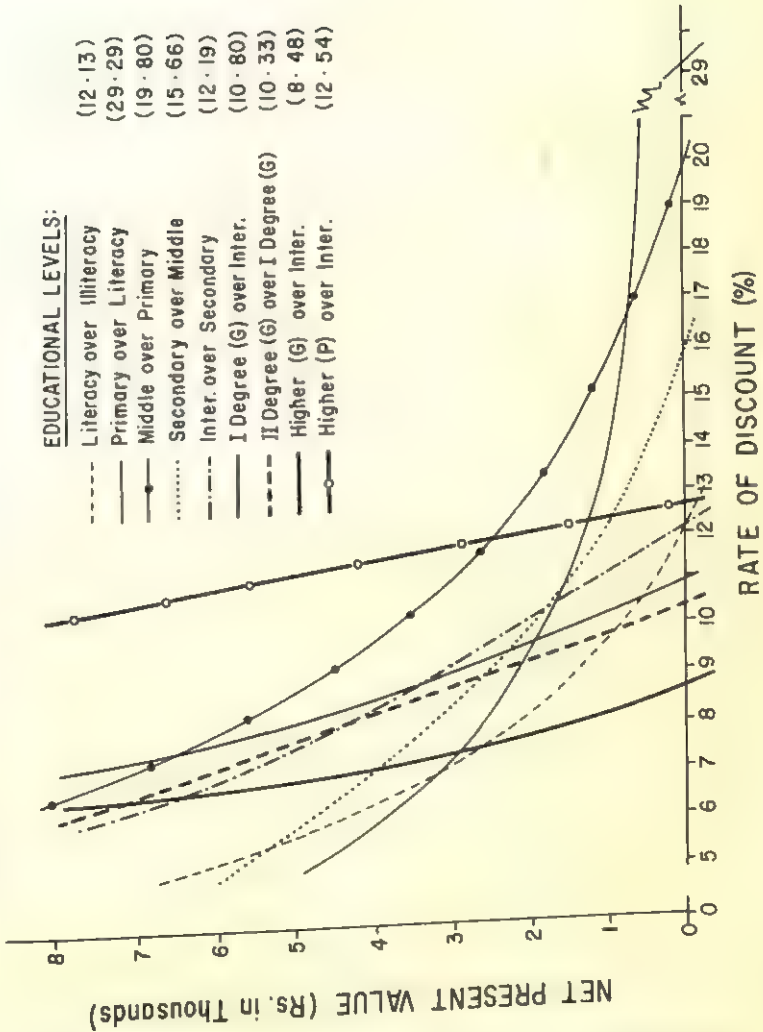


TABLE 6.4 Average Rates of Return to Education

(per cent)

	R_0	R_1	R_2	R_3	R_4	R_5
<i>A. Private</i>						
Literacy	13.38	7.93	9.69	9.51	5.41	4.14
Primary	15.31	8.22	10.00	9.63	6.16	4.76
Middle	16.70	10.78	12.68	12.45	6.80	5.39
Secondary	17.29	8.77	10.91	9.93	7.22	5.57
Intermediate	15.84	6.58	8.86	8.58	7.34	5.53
I degree (general)	13.65	6.69	8.97	8.10	7.05	5.54
II degree (general)	12.38	6.80	9.13	9.08	7.94	6.29
Higher (general)	11.64	5.78	8.11	7.52	6.51	4.94
Higher (professional)	12.49	—	—	—	—	—
<i>B. Social</i>						
Literacy	12.13	7.00	8.82	8.72	4.75	3.55
Primary	13.68	7.14	8.91	8.61	5.36	3.98
Middle	14.74	9.38	11.25	11.05	5.74	4.39
Secondary	14.98	7.13	9.25	8.51	5.91	4.35
Intermediate	13.79	5.23	7.48	7.23	6.05	4.39
I degree (general)	12.29	5.67	7.92	7.11	6.12	4.66
II degree (general)	11.09	5.91	8.20	8.09	6.96	5.42
Higher (general)	10.77	5.38	7.12	6.66	5.69	4.21
Higher (professional)	12.02	—	—	—	—	—

Notation: Same as in Table 6.3.

became negative, while the private rate of return sharply declined from 20 to 3 per cent. This was because of the alarming rates of wastage at the school level. The picture is similar at the intermediate level of education. While adjustment for growth in incomes and unemployment resulted in marginal changes in the rates of return, adjustment for non-participation in the labour force significantly changed the rates. This is, again, because of the lower participation rates in the labour force.⁸ The fully adjusted rates show a different rank ordering than the one obtained on the basis of crude rates because of the varying impact of the different adjustment factors.⁹ The adjusted marginal rates of return, both social and private,

⁸ While rates of labour force participation among men are quite high, the rates for women are deplorably low. The extremely low participation rates among women push down the overall participation rates of the sample population.

⁹ See Section on Sensitivity of the Returns to Adjustment Factors in this chapter for more details.

suggest that primary, middle and higher (I degree and II degree general) levels of education yield relatively higher rates of return than secondary and intermediate levels. The low rates of return to secondary and intermediate levels have two-fold implications. First, they stress the need for drastically reducing wastage at these levels. Second, these rates imply that secondary and intermediate levels of education do not serve as terminal levels in educational career and render, thus, the second degree (general) as the first terminal point. The pattern of variation in the average rates of return for every type of adjustment made, is almost similar to the pattern of variation in the marginal rates. The fully adjusted rates are in the range of 4 to 6 per cent. They also indicate that only second degree (general) education serves as a good terminal level.

Let us see how our estimates of rates of return compare with the estimates of other researchers in Indian education described in Chapter 4. Our crude rates of return are fairly comparable with those of Blaug *et al.* (1969). Our estimates of marginal social rates of return are 29 per cent to primary, 20 per cent to middle, 16 per cent to secondary, 11 per cent to I degree (general) and 13 per cent to higher professional education, as compared to the estimates of Blaug *et al.*¹⁰—20 per cent to primary, 17 per cent to middle, 16 per cent to secondary, 13 per cent to I degree (general) and 17 per cent to higher professional level. While our estimates are close to those of Blaug *et al.*, they are very high in comparison with Pandit's (1972) estimates. For instance, Pandit's corresponding estimates were 17 per cent to middle, 6 per cent to matriculation and less than 6 per cent to higher levels.

Our fully adjusted rates of return are very low in comparison with the estimates of Blaug *et al.* While the latter's estimates of adjusted returns were 15 per cent to primary, 14 per cent to middle, 11 per cent to secondary and 9 per cent to I degree (general), our corresponding estimates were 7 per cent, 6 per cent, negative, and 6 per cent respectively to primary, middle, secondary and I degree

¹⁰ Strictly speaking, a comparison of our estimates with those of Blaug *et al.* should not be made with respect to primary and higher levels of education because the base level over which the marginal rates have been estimated differ in these two studies. For e.g., Blaug *et al.* estimated the rate of return to primary level relative to illiteracy, and higher levels relative to matriculation, while the base levels in our study have been literacy and intermediate levels respectively.

(general) levels. This could imply that some of our estimates of the factors for which adjustment has been made are over-biased. This may be true in respect of some factors like wastage in education.¹¹

Further, Blaug *et al.* assumed a growth rate of 2 per cent, while the evidence, particularly in our context, supported our assumption of 1.5 per cent growth rate. Besides, it may be noted that we adjusted the rates of return for non-participation in the labour force in addition to the other factors which Blaug *et al.* took into consideration,¹² and this factor was observed to have significantly influenced our estimates of the rates of return.¹³ However, our adjusted rates of return are much higher than Pandit's estimates. This may indicate that our estimates of the factors of adjustment are not really very much over-biased.¹⁴ The essential reason for comparatively low estimates by Pandit could be traced to the original age-earnings profiles he used. The average lifetime earnings per annum, according to the National Council of Applied Economic Research (1967) Survey that Pandit used were only Rs. 3,228 as compared to Rs. 4,220 according to the National Council of Applied Economic Research (1962) Survey which Blaug *et al.* used and Rs. 4,475 according to our own sample survey. Thus, on the whole, it appears that our estimates of the rates of return are fairly reasonable.

INEQUALITY IN RETURNS TO EDUCATION BY SEX

Age-Earnings Profiles by Sex

It is well-known that there is discrimination against women's education and investment in their education has traditionally been regarded as uneconomic. It is of significance, therefore, to investigate how returns to women's education compare with those for men.

Our sample survey covered 678 men and 288 women workers in the selected district. On the basis of this survey, the age-earnings

¹¹ See Section on Sensitivity of the Returns to Adjustment Factors and the Conclusions in this chapter.

¹² See Chapter 4.

¹³ See Section on Sensitivity of the Returns to Adjustment Factors in this chapter.

¹⁴ Pandit (1972) has made additional adjustment for mortality, but this factor has been found to be not very important.

profiles have been constructed for men and women and are presented in Table 6.5 and graphically in Figures 6.4 and 6.5.

It may be noted in passing, that these age-earnings profiles, more or less, correspond to the general pattern of the age-earnings profiles, satisfying the characteristics of the 'well-behaved' earnings profiles discussed earlier.

TABLE 6.5 Unadjusted Average Age-Education Earnings Profiles by Sex (Before Tax)
(Rs. Per Annum)

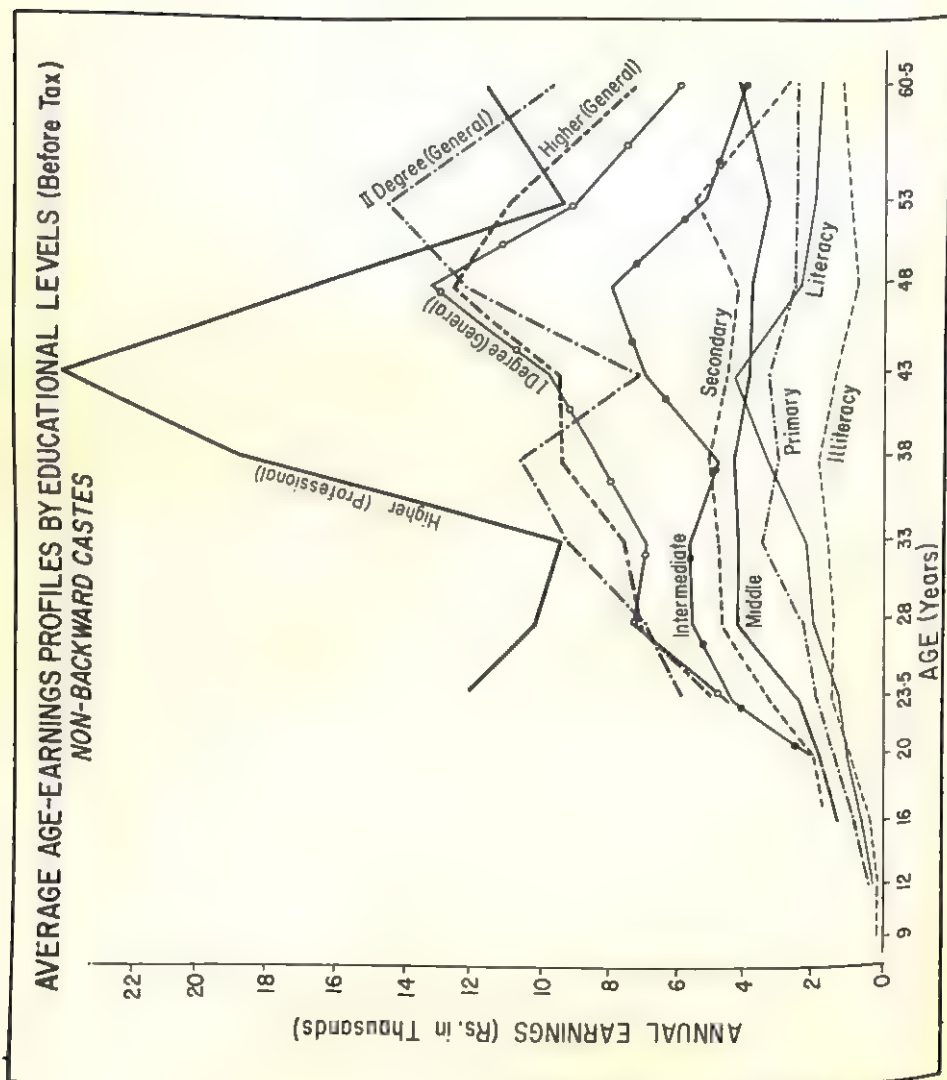
Age Group	Educational Levels					
	E_0	E_1	E_2	E_3	E_4	E_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Men</i>						
8-10	220	—	—	—	—	—
11-13	250	260	300	—	—	—
14-18	580	600	903	985	1600	—
19-21	762	1000	1501	1636	1863	2180
22-25	1285	1269	1539	2297	2969	4228
26-30	920	1920	2426	3731	4442	5477
31-35	1600	2325	3197	3206	4654	5474
36-40	2700	2840	3268	4510	5130	6673
41-45	1348	3488	3773	3718	4760	6483
46-50	2292	3439	2803	3870	4411	7526
51-55	1369	1867	2599	3444	5066	6000
55+	1214	1530	2312	3547	2046	3150
All age groups	1135	2238	2653	3449	4332	5621
	(58)	(44)	(82)	(88)	(177)	(68)
<i>Women</i>						
8-10	150	—	—	—	—	—
11-13	224	235	300	—	—	—
14-18	450	600	611	1020	1487	—
19-21	550	1000	1168	1636	2156	1440
22-25	762	1287	1427	2160	3236	4035
26-30	1267	1800	1759	4189	4252	5204
31-35	1325	1200	2225	3974	3557	5550
36-40	1536	1550	2826	4033	4568	4240
41-45	1183	1600	1800	4395	4550	5370
46-50	434	500	1933	3795	4120	7526
51-55	1369	1867	1695	2470	3614	4800
55+	701	1267	1000	1457*	2132*	2952
All age groups	872	1175	1794	3755	3822	4581
	(40)	(19)	(32)	(55)	(63)	(28)

continued

Age group	Education Levels					Number of Persons
	E_6	E_7	E_8	E_9	All Levels	
	(8)	(9)	(10)	(11)	(12)	(13)
<i>Men</i>						
8-10	—	—	—	—	220	3
11-13	—	—	—	—	266	9
14-18	—	—	—	—	1086	12
19-21	—	—	—	—	1549	21
22-25	4914	6108	5255	12000	3504	51
26-30	6615	7109	6798	10047	5019	113
31-35	7501	8661	7875	9648	5503	111
36-40	7880	11602	9823	13126	6871	91
41-45	9826	10260	9855	17000	5174	98
46-50	11250	12220	11735	16200	5684	62
51-55	9858	14053	11656	9500	4625	50
55+	6000	12848	7370	11600	3059	57
All age groups	7554	9517	8291	11975	4861	
	(90)	(48)	(138)	(23)	(678)	678
<i>Women</i>						
8-10	—	—	—	—	150	3
11-13	—	—	—	—	249	7
14-18	—	—	—	—	1024	9
19-21	—	—	—	—	1366	14
22-25	4453	5640	4802	8403*	3506	45
26-30	6356	6780	6515	11400	4476	50
31-35	5700	7760	6583	10000	4054	35
36-40	7880	11400	9053	22500	4639	52
41-45	6006	10260	7424	17000	4750	26
46-50	11250	12220	11735	16800	3970	26
51-55	5040	9600	7320	10479*	3555	12
55+	5840	6808	6324	9053*	3767	9
All age groups	5446	7632	6364	13768	3814	
	(28)	(16)	(44)	(7)	(288)	288

Note: * Estimated. Note and notations: Same as in Table 6.1.

The average life time earnings of women have been found to be much lower than the earnings of men at every educational level, except at middle and higher professional levels of education. The peak earnings of women are also lower than those of men at every level of education, except again at the higher professional level. As the figures indicate, the age-education-earnings profiles are relatively flat in case of both men and women at lower levels of education. At higher levels of education, the profiles are steeper in the case of



women than of men, indicating that the earnings of women with higher education grow at a faster rate than those of men. It may also be noted that the earnings of higher educated women in the age group of 35 and above do not significantly differ from the earnings of men in the same age group. However, the fall after the peak earnings is sharper in the case of women than in the case of men. This can be understood, if we look at it in the perspective of the working life patterns of women.

Costs of Education by Sex

The estimates relating to private and social costs of education and related aspects are presented in Table 6.6 for men and women separately. As the available sources do not give data on institutional costs of education separately by sex groups, the institutional cost of education at the school level is based on our inquiry covering a few schools exclusively meant for either sex group. For the higher levels, it is based on data collected from the records of the University Grants Commission covering all the four colleges for men and three for women in the sample district. The sex-wise private costs of education, including foregone earnings, are, however, based on our survey data.

Even though the foregone earnings or opportunity costs of education are higher for men than for women in absolute terms at every level except at the secondary level, foregone earnings as a proportion of the total private costs are higher for women at primary, middle, intermediate and higher (general) levels. As a proportion of the social costs, the foregone earnings for women are higher at primary and higher (general) levels only. On the whole, the private cost per pupil is higher for men than for women, except at secondary and higher professional levels. In the case of women the private cost of primary education is about one-third that of men's education and it is about one-half at the higher (general) level. While at the other levels, the costs are, on the whole, same for either sex group, except at the higher professional level where the costs of women's education are about 20 per cent more.

The fact that the private expenditure on women's education excluding foregone earnings, is less than that on men's education can be explained by several factors. First, the few women who

TABLE 6.6 Private and Social Costs of Education by Sex

Educational Level	(rupees per pupil per annum)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Private Expenditure	Foregone Earnings	Total Private Cost	Instinational Cost	Social Cost	% of (3) in (4)	% of (3) in (6)
Men							
Literacy	434.90	110.00	544.90	143.59	688.49	20.19	15.98
Primary	434.90	138.00	572.90	143.59	716.49	24.09	19.26
Middle	151.56	300.00	451.56	324.67	776.23	66.44	38.65
Secondary	226.58	985.00	1211.58	378.75	1590.33	81.30	61.94
Intermediate	1041.91	1600.00	2641.91	541.86	3183.77	60.56	50.25
I degree (general)	1410.00	2053.33	3463.33	541.86	4005.19	59.29	51.27
II degree (general)	1814.29	3724.00	5538.29	541.86	6080.15	67.24	61.25
Higher (general)	3497.37	2721.60	6218.97	541.86	6760.83	43.76	40.26
Higher (professional)	1479.17	2513.60	7010.77			35.85	
Women							
Literacy	105.08	75.00	180.08	210.75	390.83	41.65	19.19
Primary	105.08	101.00	206.08	210.75	416.83	49.01	24.23
Middle	110.82	300.00	410.82	494.74	905.56	73.02	33.13
Secondary	248.28	1020.00	1268.28	593.69	1861.97	80.42	54.78
Intermediate	853.67	1487.00	2340.67	695.66	3036.33	63.53	48.97
I degree (general)	1342.50	1500.00	2842.50	695.66	3538.16	52.77	42.30
II degree (general)	2633.33	2738.00	5371.33	695.66	6066.99	50.97	45.13
Higher (general)	1485.92	1995.20	3481.12	695.66	4176.78	57.31	47.77
Higher (professional)	6501.23	1995.00	8496.23			23.48	

Note: .. Not available.

received some education, due to prevailing social customs and values had to stay at home and continue their education up to the level that was available in their own villages and towns, thus avoiding expenditure on items, which would otherwise be incurred, had they moved out of their homes and stayed in hostels or rented houses in cities and towns. Second, women have less extra-curricular activities than men, such as games and sports, social activities, purchase of non-college books, which result, on the whole, in lowering the expenditure on their education. Lastly, the parents or husbands tend to invest less in the education of women than on men, in anticipation that they may not participate in the labour force in future for a variety of socio-economic and cultural factors.

The institutional cost is higher for women's education than for men's education both in absolute terms and also as a proportion of the total costs of education. On an average, the institutional cost for women works out to be Rs. 211 at the primary level, about Rs. 500 at the middle and secondary levels, and about Rs. 700 at higher levels, compared to Rs. 144 at the primary, Rs. 325 at the middle, Rs. 379 at the secondary and Rs. 542 at higher levels in the case of men. The institutional cost as a proportion of the total social costs ranges from 11 to 51 per cent in the case of women, and from 8 to 42 per cent in the case of men.

The total social cost of women's education is about one-half that of men's education at the primary level, while at the intermediate and higher levels the costs are almost equal. However, the social cost at the middle and secondary levels of education is about 17 per cent higher for women than for men.

The Rates of Return by Sex

The marginal private and social rates of return to different levels of education for both men and women separately are given in Table 6.7. The average rates are given in Table 6.8. Apart from the general features that (i) the private rates of return exceed the social rates of return for both men and women; (ii) the unadjusted rates of return show a declining trend with every increase in the level of education; and (iii) the adjustments finally push down the rates of return steeply, the following additional findings need to be mentioned.

The average unadjusted rates of return to education for all the

TABLE 6.7 Marginal Rates of Return to Education by Sex

(per cent)

	R_0	R_1	R_2	R_3	R_4	R_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>A. Private</i>						
<i>Men</i>						
Literacy-illiteracy	9.86	5.61	7.28	7.18	4.89	4.14
Primary-literacy	31.21	15.31	17.02	14.49	11.46	9.92
Middle-primary	19.23	15.15	16.99	15.68	10.15	9.23
Secondary-middle	20.54	4.14	5.77	5.28	1.95	-ve
Inter-secondary	15.50	3.60	5.18	4.86	4.10	3.16
I degree (general)-inter	11.54	8.28	9.98	8.76	7.96	6.96
II degree (g)-I degree (g)	11.39	10.48	12.18	10.40	9.60	9.58
Higher (general)-inter	6.56	3.80	5.51	5.32	4.60	3.68
Higher (professional)-inter	12.84	..	..	..	..	..
<i>Women</i>						
Literacy-illiteracy	18.71	9.06	10.89	10.32	-ve	-ve
Primary-literacy	23.55	14.30	15.99	14.67	3.70	1.73
Middle-primary	32.13	23.51	25.53	20.76	5.36	3.10
Secondary-middle	18.51	2.69	4.26	3.59	-ve	-ve
Inter-secondary	11.04	3.69	5.27	4.82	2.54	0.67
I degree (general)-inter	9.85	7.12	8.81	7.91	5.11	3.19
II degree (g)-I degree (g)	14.16	12.99	14.78	13.91	9.28	6.44
Higher (general)-inter	8.95	5.75	7.51	7.28	4.14	2.03
Higher (professional)-inter	12.80	..	..	..	..	..
<i>B. Social</i>						
<i>Men</i>						
Literacy-illiteracy	8.80	4.73	6.50	6.41	4.19	3.48
Primary-literacy	27.48	13.28	15.90	14.18	11.06	8.54
Middle-primary	14.29	10.93	13.46	12.62	7.81	6.39
Secondary-middle	16.84	1.95	3.75	2.86	-ve	-ve
Inter-secondary	13.54	2.72	4.29	4.02	3.33	2.43
I degree (general)-inter	10.76	7.67	9.37	8.31	7.55	6.95
II degree (g)-I degree (g)	10.90	10.02	11.75	10.14	9.35	9.33
Higher (general)-inter	6.36	3.63	5.33	5.13	4.43	3.51
<i>Women</i>						
Literacy-illiteracy	11.67	4.72	6.55	6.41	-ve	-ve
Primary-literacy	18.72	11.44	12.98	11.81	0.99	-ve
Middle-primary	20.68	14.98	17.81	15.63	2.42	0.48
Secondary-middle	11.66	1.07	3.22	2.95	-ve	-ve
Inter-secondary	9.55	2.60	4.90	4.07	2.34	0.39
I degree (general)-inter	9.46	6.58	8.24	8.05	4.93	2.83
II degree (g)-I degree (g)	12.40	11.34	13.06	12.57	7.93	4.98
Higher (general)-inter	8.05	4.94	6.81	6.69	3.55	1.48

Note and Notations: Same as Table 6.3.

TABLE 6.8 Average Rates of Return to Education by Sex

(per cent)

	R_0	R_1	R_2	R_3	R_4	R_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>A. Private</i>						
<i>Men</i>						
Literacy	9.86	5.61	7.28	7.18	4.89	4.14
Primary	13.57	7.48	9.24	8.94	7.16	6.23
Middle	14.50	8.89	10.75	10.25	6.53	5.86
Secondary	14.77	7.36	9.42	8.70	6.83	5.76
Intermediate	14.26	5.73	7.93	7.70	6.82	5.74
I degree (general)	12.77	6.04	8.34	7.68	6.89	5.90
II degree (general)	11.69	6.36	8.64	8.42	7.64	6.66
Higher (general)	9.62	4.52	6.82	6.22	5.52	4.60
Higher (professional)	12.02	..	..	..	..	..
<i>Women</i>						
Literacy	18.71	9.06	10.89	10.32	-ve	-ve
Primary	19.77	10.59	12.49	11.77	0.33	-ve
Middle	23.46	14.93	17.04	15.69	3.08	1.20
Secondary	21.01	10.16	12.55	11.85	2.41	0.48
Intermediate	16.82	7.12	9.53	9.30	5.62	3.27
I degree (general)	14.15	6.88	9.30	8.74	5.49	3.33
II degree (general)	12.66	6.76	9.23	8.88	5.48	3.21
Higher (general)	11.99	5.99	8.46	8.01	4.89	2.80
Higher (professional)	13.26	..	..	..	..	..
<i>B. Social</i>						
<i>Men</i>						
Literacy	8.80	4.73	6.50	6.41	4.19	3.48
Primary	11.99	6.39	8.11	7.89	6.22	5.34
Middle	12.40	7.47	9.28	8.89	5.41	4.78
Secondary	12.62	5.83	7.85	7.30	5.55	4.53
Intermediate	12.33	4.53	6.68	6.49	5.67	4.65
I degree (general)	11.23	4.98	7.21	6.68	5.92	4.97
II degree (general)	10.50	5.47	8.20	7.51	6.63	5.71
Higher (general)	8.67	3.76	5.99	5.56	4.84	3.93
<i>Women</i>						
Literacy	11.67	4.72	6.55	6.41	-ve	-ve
Primary	13.50	6.45	8.20	7.87	-ve	-ve
Middle	16.35	9.89	11.85	11.16	0.47	-ve
Secondary	14.83	6.61	8.75	8.39	0.49	-ve
Intermediate	12.65	4.86	7.04	6.91	3.76	1.70
I degree (general)	11.39	5.15	7.42	6.96	4.02	2.06
II degree (general)	10.59	5.60	7.97	7.77	4.90	2.89
Higher (general)	9.86	4.61	6.86	6.58	3.75	1.80

Notes and notations: Same as Table 6.3.

different levels and the unadjusted marginal rates of return to literacy, middle, II degree (general) and higher (general) education for women exceed those for men. This is primarily because of the lower costs of education of women.¹⁵ But when we make successive adjustments the picture changes significantly. The fully adjusted rates present a reversed picture. When we consider the marginal rates of return they also indicate the same trend, except that the unadjusted rates to primary, secondary, intermediate and I degree (general) levels are higher for men than for women.

Among the adjustment factors, wastage in education, growth in incomes and unemployment generally have not altered either the relative position of men and women or the rank order of educational levels. On the other hand, adjustment for non-participation in the labour force resulted in a drastic change in the magnitudes of the rates of return, the rank order of educational levels and more significantly in the relative position of men and women. This is because of very high rates of non-participation among women, as noted earlier. In fact, some rates of return turn out to be negative for women, when this adjustment is made.¹⁶ As noticed earlier, we also find that the impact of wastage in education on the rates of return to secondary and intermediate levels of education is quite significant for both sex groups.¹⁷

The differences in the rates of return to women's education as compared to men's education presented in Table 6.9 yield some more insights. The differences between the unadjusted rates indicate that, barring a few levels of education, investment in the education of women is far more advantageous than investment in men's education,¹⁸ and also that women have higher relative advantage at lower levels of education than at the higher levels, as the differences decline by increasing levels of education. In other words, men have less relative disadvantage at higher levels of education. The

¹⁵ Becker (1964: 100-2) was also led to make a similar observation that the rate of return to women might not be lower than that for men 'because direct costs are somewhat lower and opportunity costs are much lower for women'.

¹⁶ For instance, we can note that the unadjusted rates R_0 , and R_1 , R_2 , and R_3 show that women's education in general, is more productive than men's education, while R_4 (i.e., rates additionally adjusted for labour force participation rates) show the reverse order.

¹⁷ See Section on Sensitivity of the Returns to Adjustment Factors in this chapter.

¹⁸ Cf. Behrman and Wolfe (1984).

Fig.6.6

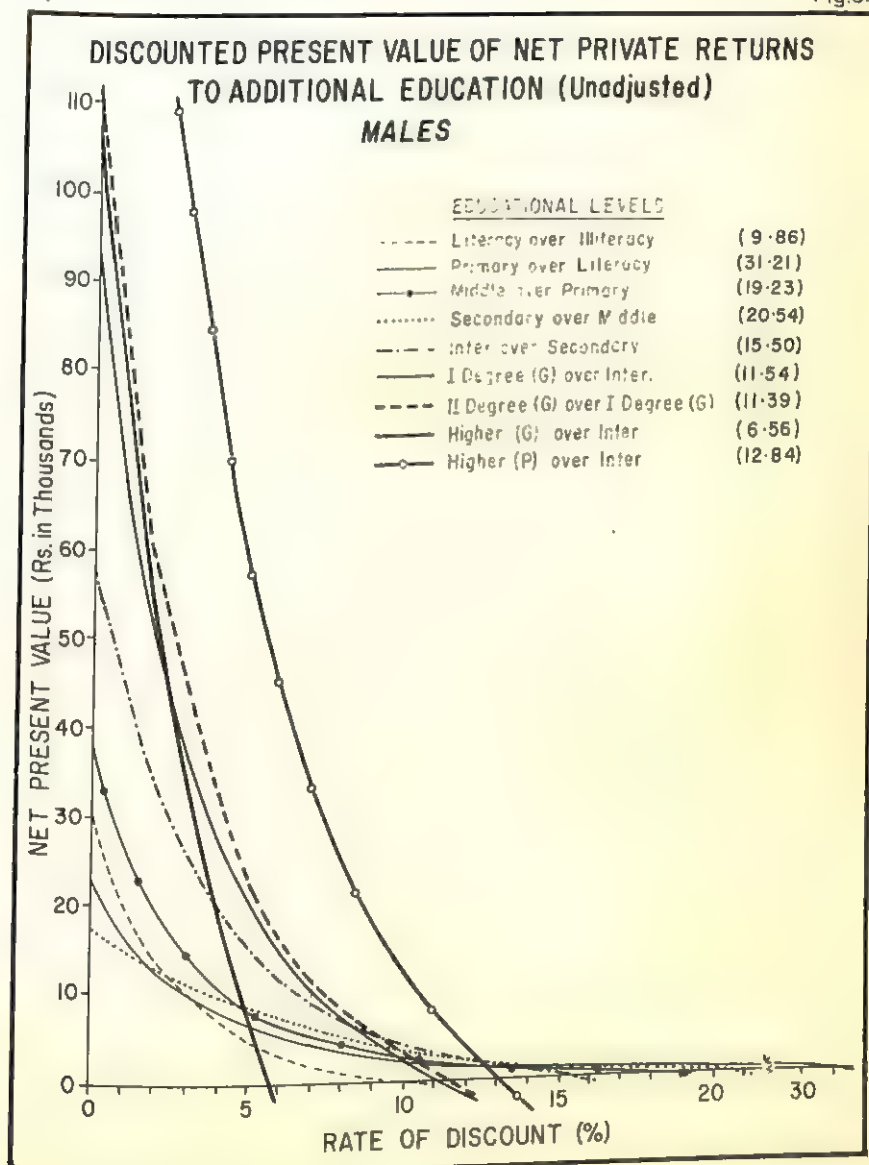


Fig.6.7

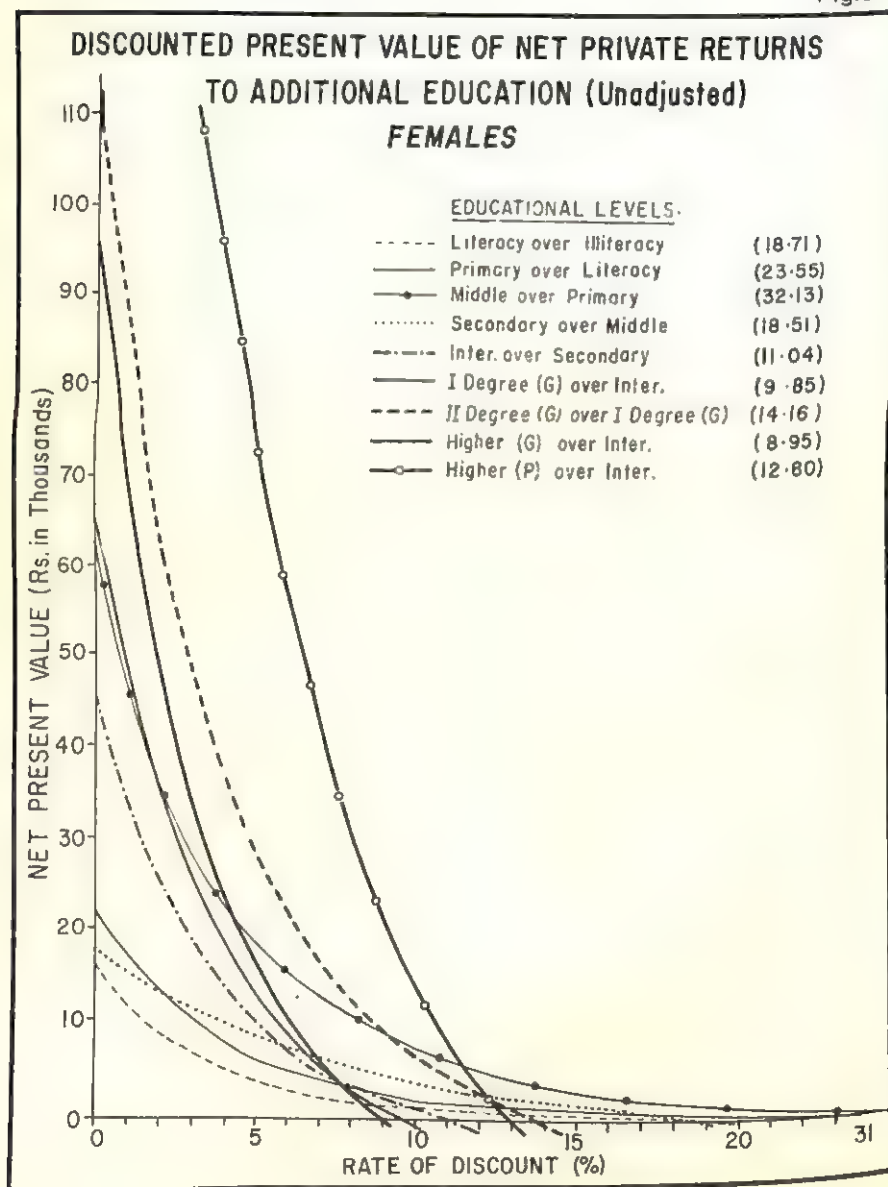
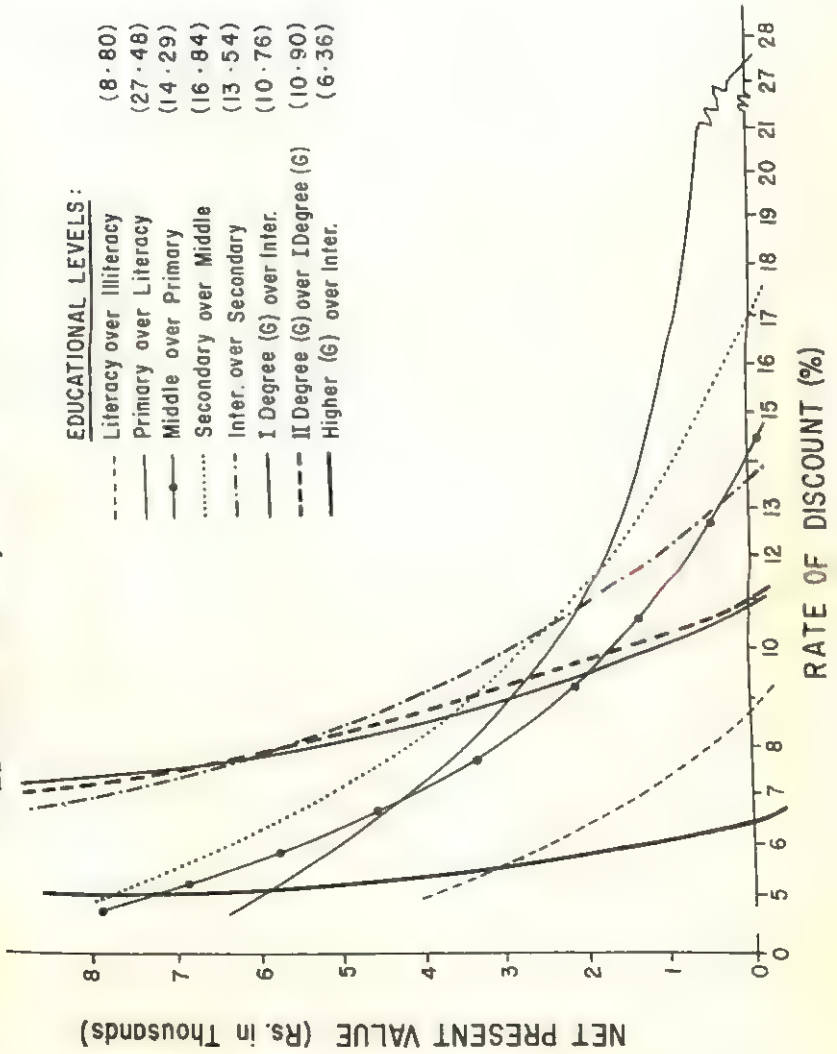
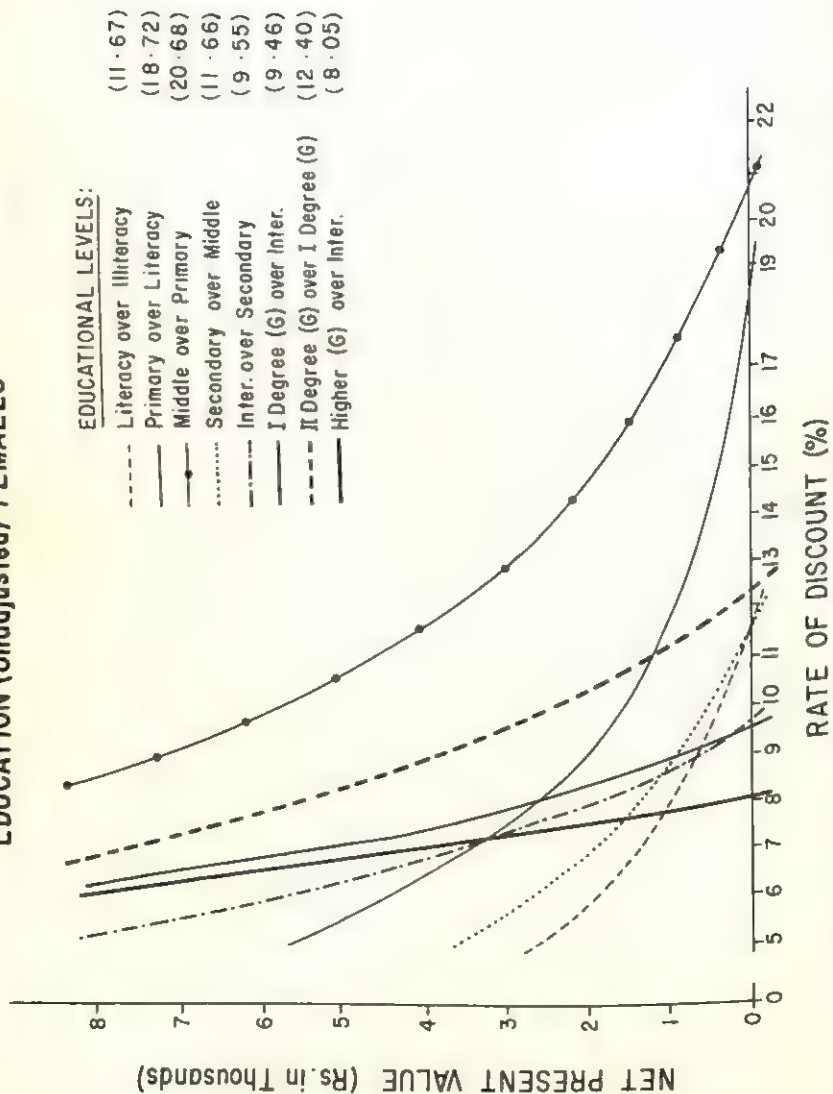


Fig. 6.8

DISCOUNTED PRESENT VALUE OF NET SOCIAL RETURNS TO ADDITIONAL EDUCATION (Unadjusted) MALES



DISCOUNTED PRESENT VALUE OF NET SOCIAL RETURNS TO ADDITIONAL EDUCATION (Unadjusted) FEMALES



differences between the fully adjusted rates of return, however, present a reverse picture. The relative disadvantage for women is less at the higher levels of education, i.e., men have a relative advantage at the lower levels of education than at the higher levels. This reversal of the picture emerges chiefly as a result of adjustment for non-participation in the labour force. As we have seen, the labour force participation rates for women significantly rise with an increase in the level of education.

In the few cases where the rates of return to women's education exceed those of men, it was due to the low costs of their education. On the whole, the rates of return to women's education are low due to the lower average earnings of women and the lower rate of

TABLE 6.9 Difference in Sex-Wise Returns to Education (Rates of Return to Women's Education minus Rates of Return to Men's Education)

	<i>Differences in Rates of Returns</i>			
	<i>Unadjusted</i>		<i>Fully Adjusted</i>	
	<i>Private</i>	<i>Social</i>	<i>Private</i>	<i>Social</i>
(1)	(2)	(3)	(4)	(5)
<i>Differences in Marginal Rates</i>				
Literacy-illiteracy	8.85	2.87	..	..
Primary-literacy	-7.66	-8.76	-8.19	..
Middle-primary	12.90	6.39	6.13	3.91
Secondary-middle	-2.03	-5.18	..	..
Inter-secondary	-4.46	-3.99	-2.49	-2.04
I degree (general)-inter	-1.69	-1.30	-3.14	-4.12
II degree (g)-I degree (g)	2.77	1.50	-2.14	-4.35
Higher (general)-inter	2.39	1.69	1.65	-2.03
Higher (professional)-inter	-0.04	..	..	..
<i>Differences in Average Rates</i>				
Literacy	8.85	2.87	..	..
Primary	6.20	1.51	..	..
Middle	8.96	3.95	-4.66	..
Secondary	6.24	2.21	-5.28	..
Intermediate	2.56	0.32	-2.47	-2.95
I degree (general)	1.38	0.16	-2.57	-2.91
II degree (general)	0.97	0.09	-3.45	-2.82
Higher (general)	2.37	1.19	-1.80	-2.13
Higher (professional)	1.24	..	..	..

Note: .. Not available.

participation in the labour force. As Woodhall (1973-a) argues, while the former factor supports the case for equal pay, the latter raises some doubts about the validity of conventional rates of return measures, which ignore the value of non-market work.¹⁹ Woodhall concludes that if some allowance was made for the value of non-market work, this would considerably increase the income differential of educated women, and hence the private and social rates of return to their education.

INEQUALITY IN RETURNS TO EDUCATION BY CASTE

Age-Earnings Profiles by Caste Groups

We have classified the sample population into backward and non-backward castes. Our sample covered 397 members of the labour force belonging to the backward castes and 569 members belonging to the non-backward castes. Age-earnings profiles were constructed by educational levels separately for the two caste groups (see Table 6.10 and Figures 6.10 and 6.11). While the two sets of age-earnings profiles generally correspond to the pattern of the age-earnings profiles, satisfying the characteristics of the 'well-behaved' earnings profiles, the average lifetime earnings of the backward castes are found to be much less than the earnings of the non-backward castes at each educational level, with the exception of illiterates. The average lifetime earnings at a given level of education as a ratio of the average lifetime earnings of illiterates are also higher for the non-backward castes than for the backward castes. This indicates that every increment in education leads to a higher rate of increment in earnings in the case of the non-backward castes as compared to the backward castes. Not only the average lifetime earnings, but also the peak earnings of the non-backward castes are higher. The age at the peak earnings is higher for the backward castes than for others at lower levels of education and the

¹⁹ Apart from several forms of non-market work of women the value of which could easily be understood, though it could not be quantified, yet another kind of non-market work was identified by Benham (1975), who found a positive and statistically significant association between wife's schooling and husband's earnings. See also Woodhall (1973-b).

reverse in the case of higher levels. Further, Figures 6.10 and 6.11 clearly show that except at the lower levels where the slopes of the profiles are equally flat in both cases, the profiles of the non-backward castes are steeper at higher levels of education, indicating that the earnings of the non-backward castes with higher education

TABLE 6.10 Unadjusted Average Age-Education Earnings Profiles by Caste Group (Before Tax)

(rupees)

Age Group	Educational Level					
	E_0	E_1	E_2	E_3	E_4	E_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Backward Castes</i>						
8-10	215	—	—	—	—	—
11-13	228	235	240	—	—	—
14-18	399	500	800	753	900	—
19-21	540	1000	1123	1472	1900	2452*
22-25	693	1252	1433	2241	2721	3900
26-30	800	1720	2112	3653	3868	4987
31-35	1325	1703	2571	3008	3953	5100
36-40	1336	1965	3059	4223	4601	7000
41-45	1260	2717	4400	4054	4924	5506
46-50	1633	3227	2800	3783	4314	6928
51-55	1415	1414	2296	2510	4395	5100
56 and above	798	1378	1233	2241	1107	2000
All age groups	1121	1809	2161	3405	3966	5345
	(60)	(39)	(55)	(82)	(81)	(34)
<i>Non-Backward Castes</i>						
8-10	220	—	—	—	—	—
11-13	243	260	360	—	—	—
14-18	540	700	860	1350	1720	—
19-21	1104	1000	1403	1800	1959	1995
22-25	1493	1350	1800	2424	3191	4353
26-30	1467	2000	2283	4191	4654	5564
31-35	1600	2197	3450	4212	4681	5610
36-40	1833	3300	3105	4335	5130	4820
41-45	1400	4400	3345	3985	4636	7089
46-50	800	2500	2478	3891	4384	7974
51-55	1000	2018	2513	3367	5581	5250
56 and above	1226	1867	2552	4200	2750	4102
All age groups	1083*	2047	2632	3782	4327	5508
	(38)	(24)	(59)	(61)	(159)	(62)

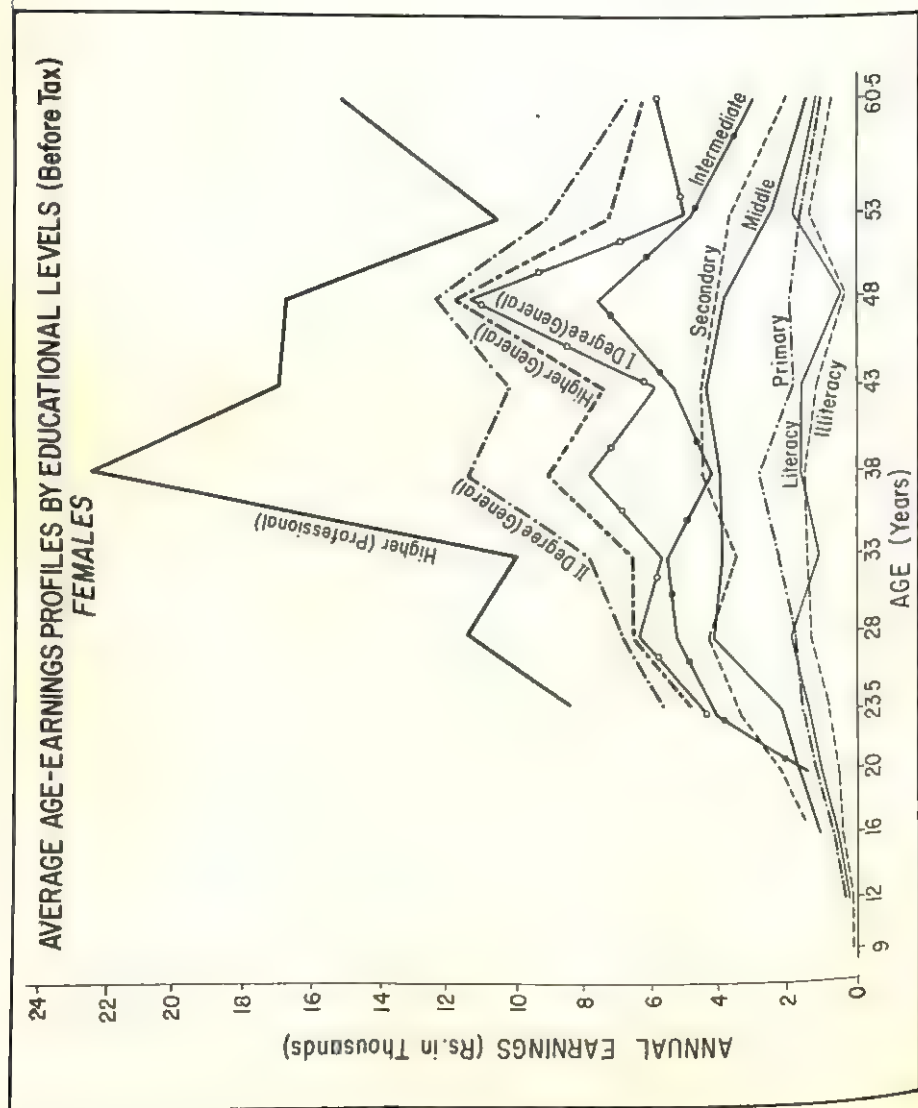
continued

Age Group	Educational Level					Number of Persons
	<i>E₆</i>	<i>E₇</i>	<i>E₈</i>	<i>E₉</i>	All	
						(All Levels)
	(8)	(9)	(10)	(11)	(12)	(13)
<i>Backward Castes</i>						
8-10	—	—	—	—	215	2
11-13	—	—	—	—	234	6
14-18	—	—	—	—	707	8
19-21	—	—	—	—	1122	17
22-25	4974	5700	5077	11418*	2697	40
26-30	5028	7800	5336	12000	3706	59
31-35	8280	7116	7698	10020	4088	53
36-40	6793	13350	12085	13608	5113	69
41-45	5496	13200	8922	10000	4331	55
46-50	5400	9900*	7650	14400	3412	40
51-55	6630	8160	7395	11869*	2905	24
56 and above	2600*	3200*	2900*	4655*	1363	24
All age groups	5925	8443	6807	11442	3526	
	(26)	(11)	(37)	(9)	(397)	397
<i>Non-Backward Castes</i>						
8-10	—	—	—	—	220	4
11-13	—	—	—	—	273	10
14-18	—	—	—	—	1275	13
19-21	—	—	—	—	1770	18
22-25	4546	5867	4986	12000	4081	56
26-30	7215	6997	7119	10235	5503	104
31-35	6946	9289	7615	9550	5656	93
36-40	8288	10611	9505	18733	6490	74
41-45	9776	7320	9601	24000	5686	69
46-50	13200	12220	12656	16800	6522	48
51-55	8894	14533	11009	9500	5301	38
56 and above	5968	9828	7351	11600	3925	42
All age groups	7396	8954	7975	13121	5151	
	(92)	(53)	(145)	(21)	(569)	569

Notes and notations: Same as Table 6.5.

grow at a faster rate than those of the backward castes. These findings simply reinforce the fact of inequality, which is a characteristic of most of the less developed capitalist economies.²⁰

²⁰ See Bowles (1980).



Costs of Education by Caste Groups

The institutional costs of education by caste groups at the primary level have been computed on the basis of our inquiry, covering eight schools exclusively or largely meant for the backward castes and four for the non-backward castes in the sample district. For the middle and higher levels, data on scholarships, stipends, fee concessions, etc., are available separately for the backward castes at the State level. These have been used to arrive at the institutional cost per pupil for the two caste groups. The logic of the procedure is as follows:

If C_g represents the total institutional expenditure on education, S represents the total expenditure on scholarships, stipends, fee concessions, etc., and N represents the total number of enrolments, then

$$(C_g - S)/N = c'_g \quad (6.1)$$

where c'_g is institutional expenditure per pupil, net of scholarships, stipends and fee concessions. If the numbers of enrolments among the backward and non-backward castes are denoted by N_b and N_{nb} respectively, and the corresponding expenditures on scholarships, stipends, fee concessions, etc., by S_b and S_{nb} respectively, then

$$s_b = S_b/N_b \quad (6.2)$$

and
$$s_{nb} = S_{nb}/N_{nb} \quad (6.3)$$

where s_b and s_{nb} represent expenditures on scholarships, stipends, fee concessions, etc., per pupil among the backward and non-backward castes respectively. The total institutional cost per pupil for these two caste groups, c^*_{gb} and c^*_{gnb} are given by the following equations:

$$c^*_{gb} = c'_g + s_b \quad (6.4)$$

and
$$c^*_{gnb} = c'_g + s_{nb} \quad (6.5)$$

The private expenditure on education along with the foregone earnings have been computed on the basis of our survey data and the age-earnings profiles are based on it. The sum of the private expenditure and the foregone earnings gives the private costs of education; and the sum of the private cost and the institutional cost, net of transfers, gives the social cost. The details of private and social

costs by caste groups are presented in Table 6.11. This table clearly reveals that the private and social costs of education of the backward castes are lower than those of the non-backward castes. The per pupil private cost of primary education in the case of the backward castes is less than half of that of the non-backward castes, and about two-thirds of the cost at other levels, except I degree and II degree (general) education. At the latter levels, private costs are almost equal for both groups. However, the weighted average cost of I degree and II degree (general) education of the backward castes is about 65 per cent of that of the non-backward castes. The total social costs of I degree and II degree (general) education of the backward castes exceed marginally those of the non-backward castes. The social cost of primary education of the backward castes, however, is a little over half of that of the non-backward castes and about 80 per cent at the middle level, and approximately 70 per cent at the other levels.

The tendency of the backward castes to spend less on education can be easily understood in terms of their relatively weaker economic position. Further, the differences in the age-earnings profiles of the two groups are reflected in their respective foregone earnings. The foregone earnings are higher for the non-backward castes than for the backward castes. The large disparities in foregone earnings can be attributed to several factors including wage discrimination as we shall see later.²¹

The foregone earnings constitute a major part of the cost structure of both caste groups. They comprise between 55 to 78 per cent of the private costs of education of the backward castes and between 25 to 83 per cent in the case of the non-backward castes. Even in the social cost structure, the foregone earnings constitute an important part—between 38 to 66 per cent in the case of the backward castes and between 21 to 67 per cent in the case of the other group. The inequality in the social and private costs between the backward and non-backward castes is of a similar order. This is because the institutional cost, being higher for the backward castes makes up for the low private expenditure in their case compared to the non-backward castes. However, this does not mean that the social costs of education of these two groups are equal. It simply suggests that the institutional component, even though higher for the backward castes, is still

²¹ The non-backward castes intend to spend more than the backward castes on education for various non-economic reasons. See conclusions in this chapter.

TABLE 6.11 Private and Social Costs of Education by Caste Group

(rupees per pupil per a.n.num)

<i>Educational Level</i>	<i>Private Expenditure</i>	<i>Foregone Earnings</i>	<i>Total Private Cost</i>	<i>Institutional Cost</i>	<i>Social Cost</i>	<i>% of (3) in (4)</i>	<i>% of (3) in (6)</i>	<i>% of (4) in (6)</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Non-Backward Castes								
Literacy	419.01	110.00	529.01	99.65	628.66	20.8	17.5	84.1
Primary	419.01	156.00	555.01	99.65	654.66	24.5	20.8	84.8
Middle	158.29	360.00	518.29	244.28	762.57	69.5	77.2	68.0
Secondary	269.23	1,350.00	1,619.23	404.98	2,024.21	83.4	60.7	80.0
Intermediate	1,019.25	1,720.00	2,739.25	504.40	3,243.65	62.8	53.0	83.4
1 degree (general)	1,377.59	1,910.00	3,287.59	504.40	3,791.99	58.1	50.4	86.7
2 degree (general)	2,237.50	3,124.50	5,362.00	504.40	5,866.40	59.7	54.7	91.7
Higher (general)	3,583.50	2,471.80	6,055.30	644.40	6,699.70	40.8	77.7	92.3
Higher (professional)	4,479.17	2,415.60	6,894.77	..	..	35.0	..	..
Backward Castes								
Literacy	110.54	107.50	218.04	95.65	313.69	49.3	33.8	68.6
Primary	110.54	132.00	242.54	108.00	350.54	54.4	37.7	69.2
Middle	110.54	240.00	350.54	251.77	602.31	67.3	39.4	58.6
Secondary	213.67	757.00	966.67	423.82	1,390.49	77.9	54.2	69.5
Intermediate	723.70	864.00	1,587.70	716.08	2,303.78	55.4	38.5	69.4
1 degree (general)	1,031.36	2,064.66	3,096.02	716.08	3,812.10	65.7	54.2	81.2
2 degree (general)	1,250.00	4,050.50	5,300.50	716.08	6,016.58	75.0	66.2	88.3
Higher (general)	1,057.91	2,859.40	3,917.31	716.08	4,633.39	73.0	61.7	84.5
Higher (professional)	1,087.42	2,539.20	3,626.62	..	..	59.8	..	..

lower than that level which can bring about equality in the total social costs of education of these two caste groups.

Returns to Education by Caste Groups

The adjusted and unadjusted marginal rates of return for the two caste groups are given in Table 6.12 and the average rates are given in Table 6.13. Each set of the rates of return, when considered within themselves, to a large extent possesses the same general characteristic features which were observed in the rates of return to education accruing to the sample population as a whole. In comparison, however, the private and social unadjusted rates of return for the backward castes are higher than those for the non-backward castes for every given level of education. The fully adjusted marginal social rates are less for the backward castes than for the non-backward castes at middle and I degree (general) levels. When we consider the fully adjusted average rates, the only exception is I degree (general) level. On the whole, the returns to education of the backward castes are higher than the returns to education of the non-backward castes. This feature, seemingly contrary to the general belief, is due to the differences in cost streams and marginal earnings of the caste groups. As we have seen in Table 6.11, the social and private costs are less for the backward castes at each level of education.

Second, even though the absolute earnings of the backward castes are lower than those of the non-backward castes, the ratio of marginal earnings, that is, of earnings differences between individuals at two successive levels of education of backward castes to that of non-backward castes is greater than one. Then, what about the average rates of return which also show a similar pattern? The average rates of return are also based on earnings differences, that is, earnings differences between individuals at a given level of education and the illiterates. Again, if such earnings differences are higher among the backward castes than among the non-backward castes, the corresponding average rates of return would be higher for the backward castes.

The structure of the earnings and costs *together* explain the higher rates of return for the backward castes, despite the fact that their annual earnings in absolute terms are less than those of the

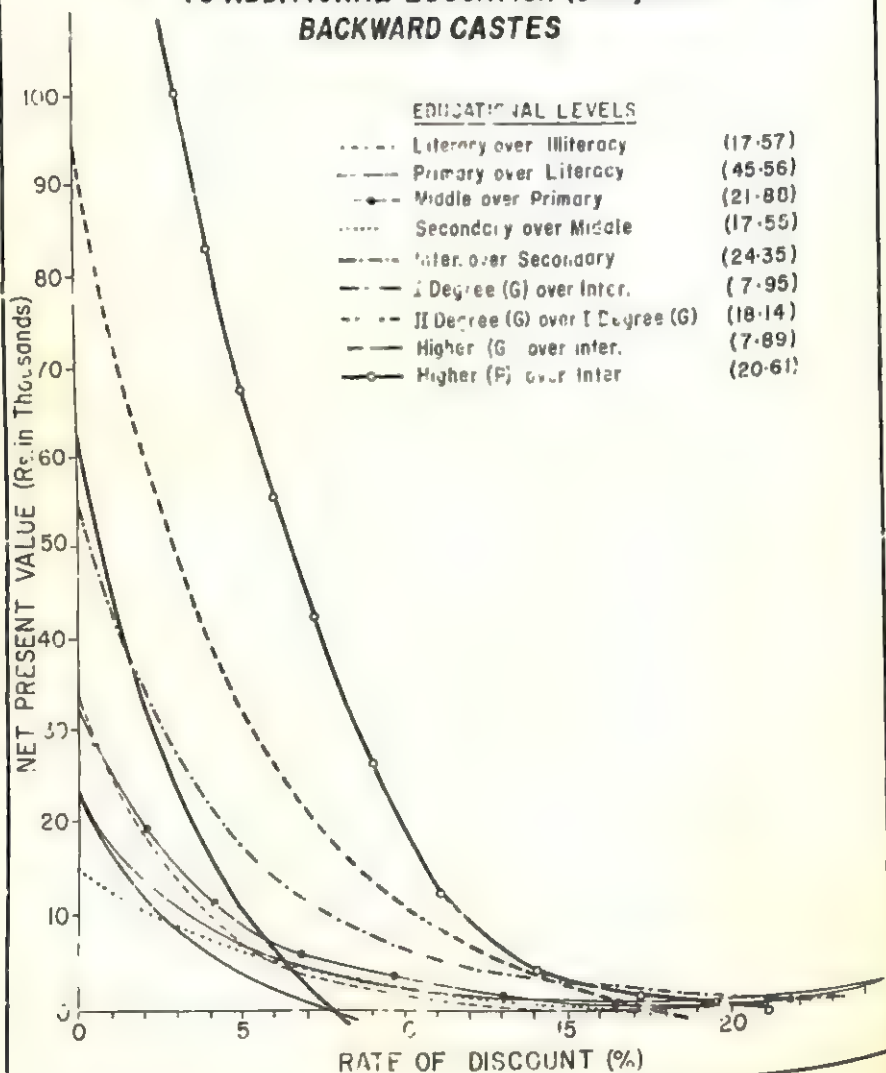
TABLE 6.12 Marginal Rates of Return to Education by Caste Group

(per cent)

	R_0	R_1	R_2	R_3	R_4	R_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Private						
<i>Backward Castes</i>						
Literacy-illiteracy	17.57	9.95	11.77	11.72	10.56	8.47
Primary-literacy	45.57	18.37	20.14	17.56	15.75	12.72
Middle-primary	21.88	16.04	17.90	16.65	15.02	12.05
Secondary-middle	17.56	2.46	4.03	3.08	1.62	-ve
Inter-secondary	24.35	5.65	7.27	6.79	5.59	3.47
I degree (general)-inter	7.95	3.03	4.70	4.29	3.14	1.14
II degree (g)-I degree (g)	18.14	14.55	16.36	13.68	11.97	8.96
Higher (general)-inter	7.89	3.59	5.33	5.08	4.24	2.01
Higher (professional)-inter	20.61					
<i>Non-Backward Castes</i>						
Literacy-illiteracy	10.24	6.41	8.06	8.02	6.47	5.54
Primary-literacy	28.48	13.42	15.11	13.02	9.24	7.28
Middle-primary	27.76	20.69	22.67	16.85	13.58	11.77
Secondary-middle	23.32	2.26	3.85	1.86	-ve	-ve
Inter-secondary	12.60	2.92	4.52	4.36	2.45	1.39
I degree (general)-inter	12.07	9.11	10.84	10.67	7.98	6.55
II degree (g)-I degree (g)	8.86	8.26	9.30	7.97	6.08	4.99
Higher (general)-inter	6.84	4.11	5.83	5.62	3.53	2.35
Higher (professional)-inter	14.76					
B. Social						
<i>Backward Castes</i>						
Literacy-illiteracy	14.63	7.80	9.55	9.51	8.48	6.62
Primary-literacy	36.86	15.35	17.07	15.34	13.75	11.00
Middle-primary	17.05	11.84	13.63	12.85	11.40	8.78
Secondary middle	13.36	-ve	1.47	0.46	-ve	-ve
Inter-secondary	18.62	3.56	5.14	4.84	3.77	1.66
I degree (general)-inter	7.09	3.13	4.79	3.77	2.64	0.65
II degree (g)-I degree (g)	15.40	12.53	14.29	12.24	10.74	7.99
Higher (general)-inter	7.15	2.85	4.60	4.57	3.39	1.26
<i>Non-Backward Castes</i>						
Literacy-illiteracy	9.55	5.81	7.49	7.47	5.88	4.96
Primary-literacy	25.84	11.92	13.61	11.84	8.25	6.43
Middle-primary	21.65	16.04	17.93	14.14	11.18	9.57
Secondary-middle	18.80	-ve	1.42	-ve	-ve	-ve
Inter-secondary	11.15	2.20	3.77	3.65	1.80	0.78
I degree (general)-inter	11.40	8.54	10.25	10.08	7.51	6.05
II degree (g)-I degree (g)	7.96	7.43	9.07	7.42	5.61	4.57
Higher (general)-inter	6.58	3.90	5.62	5.42	3.36	2.19

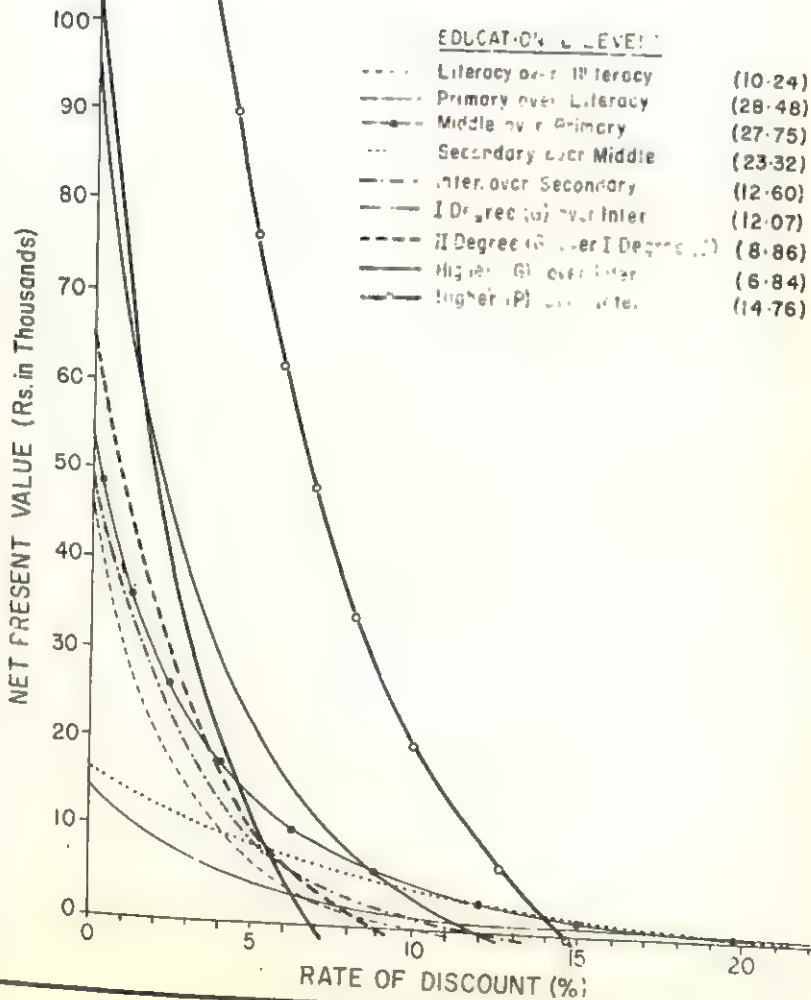
Notation: Same as Table 6.3.

DISCOUNTED PRESENT VALUE OF NET PRIVATE RETURNS TO ADDITIONAL EDUCATION (Unadjusted) BACKWARD CASTES

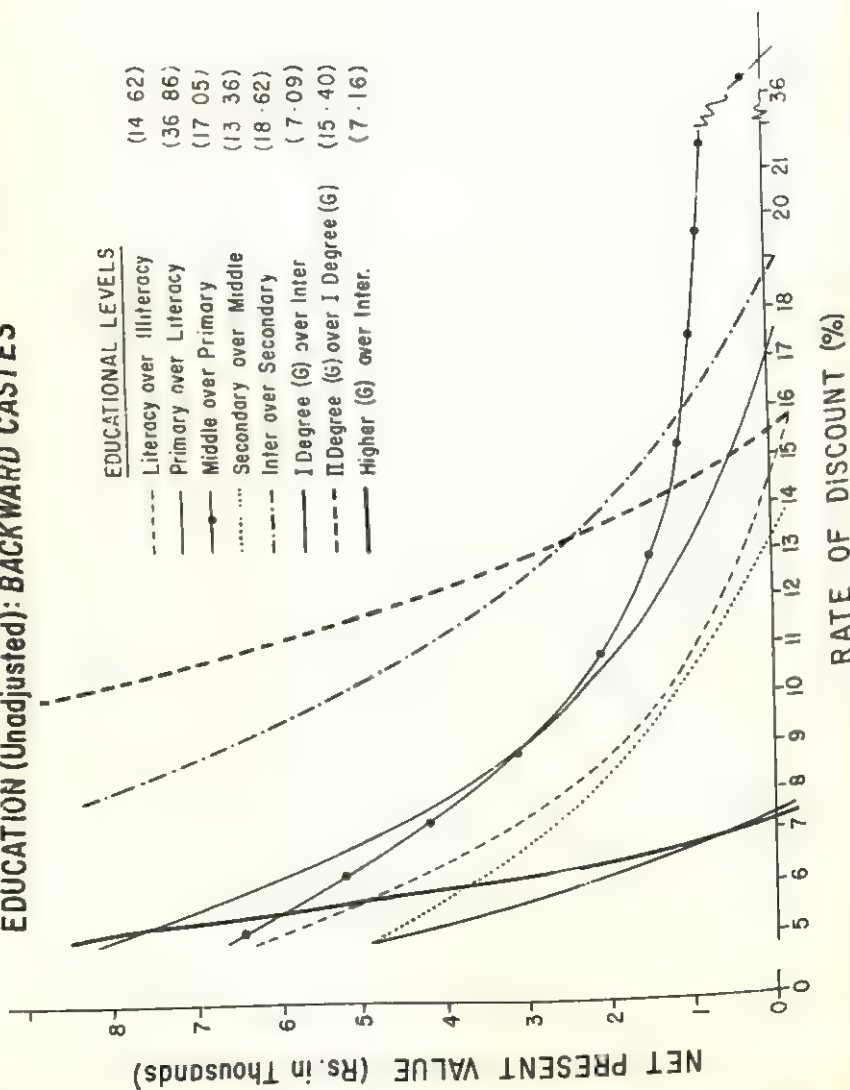


DISCOUNTED PRESENT VALUE OF NET PRIVATE RETURNS TO ADDITIONAL EDUCATION (Unadjusted)

NON-BACKWARD CASTES



DISCOUNTED PRESENT VALUE OF NET SOCIAL RETURNS TO ADDITIONAL EDUCATION (Unadjusted): BACKWARD CASTES



DISCOUNTED PRESENT VALUE OF NET SOCIAL RETURNS TO ADDITIONAL EDUCATION (Unadjusted) NON-BACKWARD CASTES

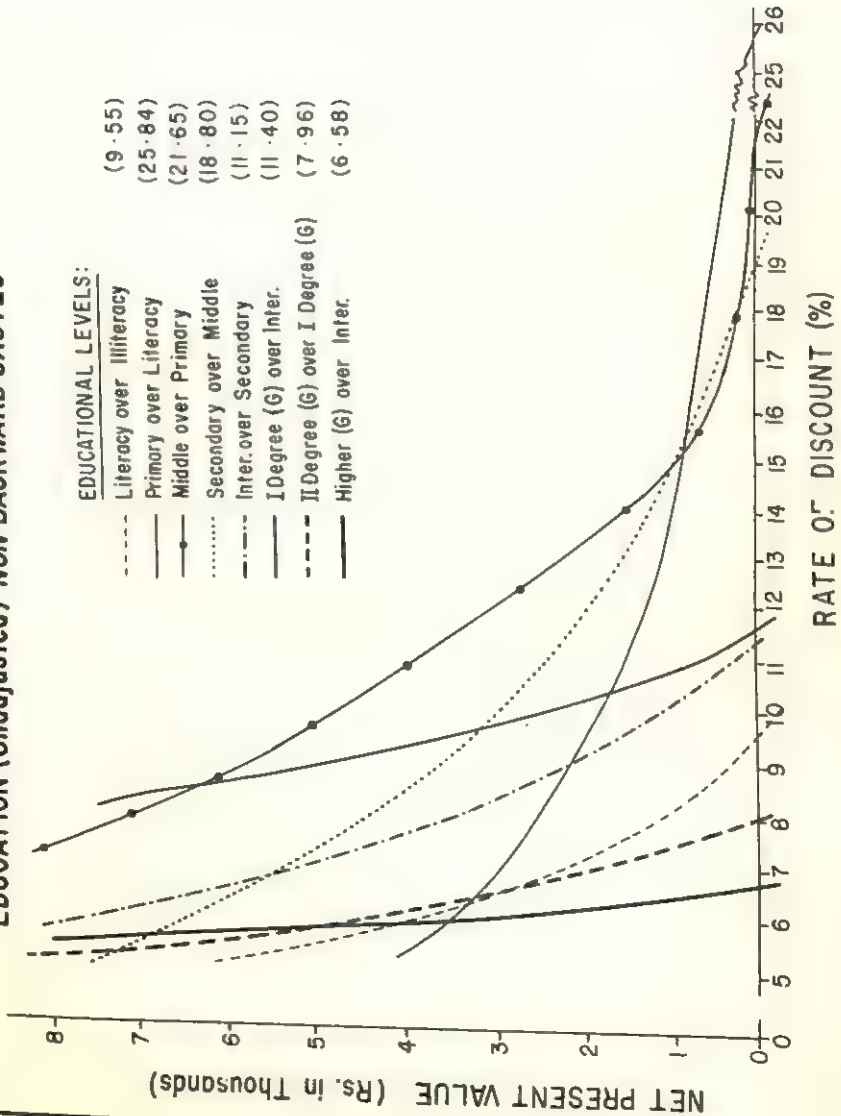


TABLE 6.13 Average Rates of Return to Education by Caste Group
(per cent)

	R_0	R_1	R_2	R_3	R_4	R_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>A. Private</i>						
<i>Backward Castes</i>						
Literacy	17.57	9.95	11.77	11.72	10.56	8.47
Primary	22.38	12.21	14.13	13.84	12.48	10.02
Middle	21.25	12.90	14.92	14.14	12.82	10.42
Secondary	19.71	9.22	11.47	10.52	9.25	6.95
Intermediate	19.77	7.77	10.18	9.73	8.39	5.96
I degree (general)	14.86	6.23	8.67	7.78	6.64	4.56
II degree (general)	14.33	7.18	9.71	9.42	8.15	5.88
Higher (general)	12.15	5.06	7.57	6.86	5.78	3.77
Higher (professional)	17.31	..	..	..	..	..
<i>Non-Backward Castes</i>						
Literacy	10.24	6.41	8.06	8.02	6.47	5.54
Primary	12.87	7.36	9.09	8.81	6.89	5.83
Middle	15.88	9.82	11.70	10.57	8.47	7.29
Secondary	14.24	6.93	8.93	8.48	6.27	5.01
Intermediate	12.80	5.10	7.28	7.10	4.93	3.76
I degree (general)	12.34	5.97	8.24	7.76	5.68	4.51
II degree (general)	11.16	6.16	8.44	7.99	5.92	4.76
Higher (general)	9.45	4.54	6.82	6.38	4.39	3.24
Higher (professional)	12.92	..	..	..	..	..
<i>B. Social</i>						
<i>Backward Castes</i>						
Literacy	14.63	7.80	9.55	9.51	8.48	6.62
Primary	18.47	9.78	11.63	11.44	10.23	8.07
Middle	17.38	10.16	12.10	11.60	10.40	8.21
Secondary	16.01	6.81	8.93	8.31	7.14	5.05
Intermediate	16.03	5.49	7.77	7.47	6.26	4.10
I degree (general)	12.86	4.62	6.93	6.08	5.00	3.07
II degree (general)	12.21	5.56	7.92	7.73	6.58	4.48
Higher (general)	10.76	3.97	6.40	5.79	4.76	2.83
<i>Non-Backward Castes</i>						
Literacy	9.55	5.81	7.49	7.47	5.88	4.96
Primary	11.83	6.63	8.36	8.09	6.28	5.24
Middle	14.16	8.68	10.54	9.60	7.59	6.46
Secondary	12.64	5.83	7.85	7.44	5.33	4.14
Intermediate	11.39	4.19	6.32	6.17	4.10	2.95
I degree (general)	11.17	5.17	7.39	6.95	4.93	3.81
II degree (general)	10.14	5.21	7.44	7.25	5.23	4.07
Higher (general)	8.68	3.90	6.16	5.78	3.85	2.77

Notation: Same as Table 6.3.

non-backward castes as revealed by the earnings profiles (Table 6.10) and by the coefficients of wage discrimination in Chapter 8.

The differences of the unadjusted marginal rates of return to education of the backward castes over the non-backward castes (see Table 6.14) show no systematic pattern. But the differences with respect to the adjusted marginal as well as the adjusted and unadjusted average rates of return to education clearly show that investment in education of the backward castes is more productive at almost all levels, and that the relative advantage is higher for the backward castes at lower levels of education. The latter point is broadly in agreement with the Bowles' (1971) hypothesis that the benefits of lower levels of education accrue relatively more to the *masses* and the benefits of higher levels of education to the *elite*.

TABLE 6.14 Differences in the Caste-Wise Returns to Education (Rates of Return to Backward Castes' Education minus Rates of Return to Non-Backward Castes' Education)

	Unadjusted		Fully Adjusted	
	Private	Social	Private	Social
(1)	(2)	(3)	(4)	(5)
<i>Difference in Marginal Rates</i>				
Literacy-illiteracy	7.13	5.08	2.93	1.66
Primary-literacy	17.09	11.02	5.44	4.57
Middle-primary	-5.88	-4.60	0.28	-0.79
Secondary-middle	-5.76	-5.44	..	..
Inter-secondary	11.75	7.47	2.08	0.88
I degree (general)-inter	-4.12	-4.31	-5.41	-5.40
II degree (g)-I degree (g)	9.28	7.44	3.97	3.42
Higher (general)-inter	1.05	0.58	-0.34	-0.93
Higher (professional)-inter	5.85	..	..	..
<i>Difference in Average Rates</i>				
Literacy	7.33	5.08	2.93	1.66
Primary	9.51	6.64	4.19	2.83
Middle	5.37	3.22	3.13	1.75
Secondary	5.47	3.37	1.94	0.91
Intermediate	6.97	4.64	2.20	1.15
I degree (general)	2.52	1.69	0.05	-0.74
II degree (general)	3.17	2.07	1.12	0.41
Higher (general)	2.70	2.08	0.53	0.06
Higher (professional)	4.39	..	..	..

Note: Same as Table 6.9.

groups. Individuals, whose education yields larger marginal social returns, ought to receive greater public support, in order to maximise the social welfare resulting from the educational budget. As the rates of return for the backward castes are generally higher than the rates for the non-backward castes, one can safely argue for relatively greater public support for the education of the backward castes, purely on economic grounds. One need not search for non-economic reasons—adverse social status, tradition, history, etc.—for supporting such a policy; at best, these are of secondary importance.

SENSITIVITY OF THE RETURNS TO ADJUSTMENT FACTORS

Of the five factors for which the crude rates of return have been adjusted, the adjustment for income growth alone results in pushing up the rates, while all the other factors push them down. In order to appraise the relative order of the effects of adjustment factors on the crude rates of return, we carried out an exercise. The procedure to arrive at the effects of each individual factor on the crude rates is simple. To determine the effect on the fully adjusted rates we followed a procedure which yielded successive cumulatively adjusted rates. The relative share of successive adjustment factors in the total effect can be, therefore, obtained by taking the successive differences of the adjustments over the crude rates. Thus, if Δr_1 represents the percentage effect of adjustment factor (1), i.e., wastage in education on the crude rate of return; Δr_2 the percentage effect of factors (1) and (2), i.e., wastage in education and growth in incomes together; and Δr_3 the percentage effect of factors (1), (2) and (3), i.e., wastage in education, growth in incomes and unemployment on the crude rate, then $\Delta r_2 - \Delta r_1$ gives the percentage effect of growth in incomes on the crude rate and $\Delta r_3 - \Delta r_2$ gives the percentage effect of unemployment on the crude rate. In this way, the share of each adjustment factor in the total effect can be easily obtained. The percentage effects of each adjustment factor on the crude marginal social rates of return for each group and for the total sample population obtained in this way relating to the total sample population are given in Table 6.15.²²

²² Interested readers may refer to the doctoral thesis in the original form for details relating to other caste and sex groups.

From these figures, it can be observed that the effect of wastage is highest compared to the other factors at all levels of education. At secondary and intermediate levels, its effect is maximum and it accounts for more than 70 per cent. On the other hand, its share is as low as 18 per cent at II degree (general) level and as high as 55 per cent at the primary level. For the sample population as a whole, up to the middle level, the second factor of importance is labour force participation. At higher levels, its place is taken up by the income growth factor. In the case of non-backward castes and men, however, the second important factor is labour force participation at every level of education. In the case of returns for women, non-participation in the labour force is the most important factor except at the intermediate level and its effect is comparatively lower at higher levels of education. The second factor of importance here is wastage in education. While income growth and ability are next in importance in other cases, for the backward castes, after wastage in education, other factors in order of importance are ability, growth in income, non-participation in the labour force and unemployment. In all cases, the effect of unemployment on crude rates is the lowest, and in no case at any level of education does it exceed 20 per cent. Since adjustment factors work through either costs or earnings or both, for a given magnitude of an adjustment factor, the effect on the rate of return is different for different levels of education, depending upon the specific costs and earnings profiles. Group-wise, the effects

TABLE 6.15 Percentage Effect of Adjustment Factors on Crude Social Rates of Return to Additional Education

<i>Educational Level</i>	<i>Wastage in Education</i>	<i>Growth in Incomes</i>	<i>Unemployment</i>	<i>Non-participation in Labour Force</i>	<i>Ability</i>	<i>Total</i>
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Literacy-illiteracy	-42.29	15.00	-0.82	-32.73	-9.89	-70.73
Primary-literacy	-54.59	8.91	-2.83	-19.53	-7.92	-75.96
Middle-primary	-23.43	33.33	-10.25	-59.14	-8.89	-68.38
Secondary-middle	—	—	-8.94	—	—	—
Inter-secondary	-79.00	19.44	-1.06	-13.93	-12.32	-86.87
I degree (g)-inter	-27.41	15.93	-3.98	-10.93	-15.37	-41.76
II degree (g)-						
I degree (g)	-18.10	4.34	½9.23	-0.65	-9.79	-33.43
Higher (g)-inter	-34.55	22.76	-2.24	-13.21	-18.99	-46.23

~~of wastage~~ and ability on crude rates are higher in the case of backward castes as compared to the non-backward castes and the effects of non-participation in the labour force and income growth are lower. On the whole, the total effect of all these factors is lower on the rates of return for the backward castes at lower levels of education, except at the literacy level, and higher at higher levels of education, compared to the non-backward castes. Similarly, non-participation in the labour force reduced the rates of return for women more steeply than those for men at every level of education. The effect of the ability factor is greater on returns to higher education for women as compared to men. With respect to other factors, no systematic pattern was observed. On the whole, the total effect of all the factors is greater on returns for women than for men.

It is clear from the above discussion, that among the factors for which the crude rates of return have been adjusted, wastage and non-participation in the labour force are of crucial importance in pushing down the rates rather steeply. It would be useful, therefore, to check how sensitive the fully adjusted rates of return are to marginal changes in the magnitudes of these two factors. Since these two factors are important policy variables, the sensitivity analysis would facilitate us to see whether operating on these policy instruments would pay any dividends. The sensitivity of the fully adjusted social marginal rates of return with respect to marginal changes in the pass and promotion rates in education and the rates of participation in the labour force was worked out for the sample population in terms of sex and caste groups.

It was found that the effect of a given percentage change in the rate of wastage on the marginal social rates of return was equal to the effect of the same percentage change in the rate of participation. This was due to the one-to-one correspondence between these two factors, while a 5 per cent downward change in the pass/promotion rates pushes up the cost stream by a certain magnitude and reduces the rate of return accordingly, a 5 per cent downward change in the participation rate reduces the benefit stream and reduces the rate of return by a similar order.²³ For this reason, sensitivity results with

²³ Such a correspondence appears to be specific to our sample and need not hold in general.

TABLE 6.16 Sensitivity Results for the Sample Population

Education Level	Actual Rate of Return (R_S)	Rates of Return with Alternative Assumptions					
		Increase in the Pass/Promotion Rate			Decrease in the Pass/Promotion Rate		
		5%	7%	10%	-5%	-7%	-10%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Literacy-literacy	3.55	3.6122 (1.69)	3.6718 (3.43)	3.7586 (5.88)	3.2606 (-8.15)	3.1935 (-10.04)	3.0703 (-13.51)
Primary-literacy	7.04	7.1427 (1.42)	7.2490 (2.98)	7.4013 (5.11)	6.6555 (-5.40)	6.5539 (-6.90)	6.3931 (-9.23)
Middle-primary	6.26	6.2755 (0.32)	6.5923 (5.27)	6.7201 (7.35)	5.9949 (-4.31)	5.9090 (-5.59)	5.7742 (-7.83)
Secondary-middle	—	—	—	—	—	—	—
Inter-secondary	1.60	1.7738 (10.63)	1.8406 (15.04)	1.9360 (21.00)	1.3981 (-12.62)	1.3129 (-17.94)	1.1778 (-26.39)
I degree (g)-inter	6.29	6.7164 (6.77)	6.8027 (8.11)	6.9260 (10.17)	6.2292 (-0.95)	6.1183 (-2.70)	5.9569 (-5.25)
II degree (g)-I degree (g)	7.21	7.8468 (8.88)	7.9425 (10.12)	8.1031 (12.34)	7.2014 (-0.14)	7.1848 (-0.42)	6.9928 (-3.05)
Higher (g)-inter	4.56	4.7664 (4.52)	4.8423 (6.14)	4.9506 (8.55)	4.3355 (-4.92)	4.2369 (-7.02)	4.0799 (-10.53)

Note: Figures in parentheses denote percentage change over the actual rates of return (fully adjusted).

respect to the pass and promotion rates in education alone are presented in Table 6.16.²⁴

Moreso, wastage is more directly relevant for educational planning. Nevertheless, the analysis holds true with respect to the participation rate in the labour force as well.

The returns to lower levels of education, in general, are either not sensitive to changes in the pass/promotion rates or marginally sensitive to increase in wastage at specific levels. For example, at the literacy level for the sample population and at the literacy and primary levels for men, the rates decreased more than proportionately to a given decrease in the promotion rates. It is notable that a corresponding increase in the promotion rate increased the rates less than proportionately at lower educational levels except at the primary level in the case of men. In contrast to the above, at lower levels of education, the rates are not sensitive at all to wastage in case of the backward and non-backward castes. The rates of return to intermediate level education are most or highly sensitive to changes in the wastage rate for the sample population as well as for sex and caste groups. This is because the incidence of wastage at intermediate and secondary levels of education are very high, and as such, a small 5 per cent change in it on either side results in a very significant absolute change in the costs of education. In this connection, it is important to bear in mind that the rates at this level of education are the lowest.

In comparison to the intermediate level, the rates of return are either not sensitive or less sensitive to wastage at higher levels of education except at the I degree (general) level in the case of the backward castes.

That a given percentage increase or decrease in the pass and promotion rates influences the rates of return disproportionately at different levels of education, is noteworthy. Besides, in some cases, the rates of return are sensitive to either positive or negative changes in the pass and promotion rates, but not to both. In like manner, a 5 per cent increase in the pass and promotion rate at the intermediate level increases the rate of return for the backward castes by 23.5 per cent, while it is not sensitive at all to the same order of decrease in

²⁴ These are estimated for all groups of population as well as for the total sample population. However, the results of the total sample population are given here. Interested readers may refer to the original thesis for details.

the pass or promotion rate. Such kind of partial sensitivity exists in the case of I degree and II degree (general) levels for the sample population, I degree (general) level for men and II degree (general) level for women. On the other hand, the rate of return to higher (general) level for men is sensitive only to a decrease in the pass rates. While these results indicate that any further increase in the wastage rate would reduce the rate of return more than proportionately, in the former case the returns can be improved significantly with a minor reduction in wastage. In brief, it can be concluded that our estimates of rates of return at lower and higher levels of education are not sensitive to marginal changes in wastage rates, but are highly sensitive at the intermediate levels and more so, in the case of women. The rates, which are not sensitive, can be assumed to be reasonably stable for marginal changes in wastage rates.

CONCLUSIONS

Instead of presenting a summary of all the results, that we have already discussed, we propose to highlight, in this section, the major conclusions and their policy implications, along with the limitations of the conclusions.

It is believed that these results would be of considerable policy relevance in spite of several methodological limitations and the fact that the rates of return alone cannot provide adequate guidelines for educational planning. There are several other socio-political objectives, which sometimes clash with the signals that the estimates of rates of return provide. Nevertheless, we believe that the rates of return are plausible and reflect a certain underlying 'rationality' in both private and public decisions about education.²⁵ The limitations of the rate of return analysis in education are well-known. One may still reiterate that this approach suffers from a major weakness—it fails to cover all the external benefits of education accruing to the individual as well as to society, ranging from spill-over to inter-generational economic benefits. Admittedly, therefore, while the

²⁵ See Hanoch (1967), Griliches (1970) and Psacharopoulos (1973) and for a critique, see Rosen (1976).

rate of return analysis in education cannot be meaningfully used to assess investment effectiveness of education *vis-a-vis* other sectors, it remains a potential tool for intra-sectoral and inter-group planning of investment in education. To the extent, however, the net value of benefits due to externalities is positive, our rates of return are underestimates.

Second, while years of schooling is a necessary indicator of education, this is not all. It fails to take into account the quality aspects of education, except that part of the quality which is reflected in the costs of education. This point is extremely relevant, particularly in the context of studying the inequality between the caste groups. A majority of the backward castes might receive the same years of schooling as the non-backward castes but their education is of very poor quality received in ill-equipped schools and colleges.

Throughout this study, we have considered the entire educational expenditure as an investment expenditure, which may not be wholly true.²⁶ If a part of the total expenditure was perceived as consumption, the rates of return to 'actual' investment would obviously be higher than our estimates. Further, there is a certain degree of uncertainty about our estimates of adjustment factors like the alpha coefficient. Although at lower and higher levels of education our estimates of

²⁶ Schultz (1961-b: 52-53), for instance, argued that expenditures at certain levels of education (elementary education) were primarily consumption and only secondarily investment; investment and consumption components were equal in expenditures at certain other levels (secondary); and expenditures at certain other levels of education (university education) were primarily investment and secondarily consumption. It has also been argued that expenditure on education consists of three components: present consumption, future consumption and investment (See Schultz 1971). For an early debate on the investment-consumption controversy see Schultz (1961-a and 1961-c), Shaffer (1961), Blaug (1970: 16-22), and for a recent account Lazear (1977). Further, one can argue that particularly people belonging to the higher socio-economic strata like the non-backward castes, relative to the backward castes, may acquire education for cultural reasons (see Kothari 1967-a). On the other hand, one can also argue that while the non-backward castes purchase education to 'protect' their culture, the backward castes may also do the same as it enhances their social status relatively more significantly. The argument can be meaningfully extended to non-participants in the labour force as well. The expenditure, particularly private expenditure, incurred by the non-participants in the labour force on their education may be termed as consumption expenditure, as they voluntarily opt not to participate in economic activity. On the other hand, if it is argued that non-participation in the labour force is not planned *ex-ante* then it constitutes wastage of investment resources.

the returns are generally stable, the sensitivity analysis indicates that the accuracy of the estimates at the intermediate level, in general, largely depends upon the accuracy of the estimates of the incidence of wastage and the rates of participation in the labour force. These are some of the points that ought to be borne in mind, while interpreting the estimates of the rates of return.

As we have seen, in every case, the social rate of return to education is lower than the corresponding private rate. This, almost as a rule, is due to two reasons. First, the private costs of education constitute only a fraction, however, small or big, of the social costs of education. Second, the pre-tax earnings differentials differ not very significantly from the post-tax earnings differentials and, on the whole, 'the cost correction is much stronger than the tax one so that private rate is higher than the social rate' (Psacharopoulos 1973: 66-67). Nevertheless, whereas the private rates are indicative of the structure of public demand for education, a factor relevant for educational planning, the social rates remain valid for the allocation of educational investment among various levels of education.

The estimates of the rates of return, as we have seen, generally indicate that the primary, middle, I degree (general) and II degree (general) levels of education yield higher rates of return than secondary and intermediate levels. The low rates of return to secondary and intermediate levels have two-fold implications. First, they imply the need to make efforts to drastically reduce wastage at these levels. Second, they imply that secondary and intermediate levels of education do not serve as terminal levels.

While adjusting for wastage in education, we have assumed in this study that education provided to those who drop out or fail to get promoted, yields no additional return and hence the investment made in their education constitutes a total waste of resources or just a cost without return. For some advanced countries, this assumption has been found to be unrealistic.²⁷ One does visualise that at any given level of schooling, any marginal addition to education may yield some return. But the scanty evidence we have, such as from the City Survey of Greater Bombay, suggests that 'there is virtually

²⁷ See Becker (1964) for the case of US. See also Layard and Psacharopoulos (1974) for a discussion on this issue.

no income gain from incompleting secondary school or higher education' (Blaug *et al.* 1969: 205). However, since this factor has been found to be of crucial importance, it would be necessary to dwell upon it briefly. Truly, there is no evidence to show that all the productivity raising effects of education are concentrated in the final year of a given level of education, or that the effects are related to qualifying in the final examination of that level. 'To consider incomplete education a complete wastage is to make the analogy with material production too far such as incomplete motor cars are a waste of resources.'²⁸ The thrust of this argument is that investment in education is divisible and that incomplete education also imparts additional skills and leads to higher productivity and, accordingly, higher earnings.²⁹ However, we do not have any strong empirical evidence to support this. On the other hand, it is increasingly felt that 'schooling may not be a divisible investment' (Chiswick 1973: 156). Since the evidence in either case is not strong, we adopted the line that has been conventionally followed. Since earnings are taken as the index of productivity and employers in general do not give any additional weightage to incomplete education, we do not have any method to take care of this. However, if one views the relationship between earnings and education in the job market, our assumption that incomplete education constitutes a total waste of resources appears to be not unrealistic.

The fully adjusted rates of return presented earlier indicate that investment in education of men is more productive than investment in women's education, given the adjustment factors as they are at present. But from this, we cannot promptly conclude that women's education is unjustified on economic grounds. The conventional exclusion of non-market work³⁰ and women's contribution being more in domestic than in social economy lead us to believe that the 'true' rates of return to education for women are likely to be no lower than those for men. It is, therefore, not surprising that the unadjusted

²⁸ V.N. Kothari (Personal communication).

²⁹ It would be more proper, if data are available in required detail, to estimate the rate of return to *years* of education rather than for completed *levels* of education. But in our case, data are not available.

³⁰ This limitation applies in all cases of rates of return to education. However, it becomes a serious one in the case of women, as their role in the non-market economy is relatively very high compared to that of men.

crude rates of return to education of women are generally above the rates of return for men. This means that women receive higher direct monetary returns to their education than men and social benefits from investment in their education are higher, if one does not consider adjustment factors like rates of participation in the labour force, etc.

The fully adjusted social as well as private rates of return in some cases are negative. Thus, the marginal rates of return to the secondary level for the sample population and to sex and caste groups, and the marginal rates to literacy for women are negative. The negative rates of return are generally due to the high incidence of wastage at secondary and intermediate levels and the high non-participation rates for women in the labour force. The negative rates of return may lead one to conclude that further investment should not be made at the corresponding levels of education. But even if the marginal rate of return is negative to secondary education, it would not be conclusive for investment planning at this level, because secondary education is an intermediate and necessary educational step to higher education, at which the returns are positive. In this context, the average rate of return assumes importance from the point of view of planning. The marginal rate of return to secondary education is relevant for those who plan to discontinue their education at secondary or lower levels.

The higher rates of return to the backward caste group justifies further investment in the education of this group. It is important to note that the returns are higher in spite of wage discrimination against this group, and this is primarily because of the lower per pupil cost of their education.³¹ This may as well be an indicator of the poor quality of education the backward castes receive. It is necessary, thus, not only to invest more in the education of this group but also to invest more per pupil so that the inequalities in quality of education are reduced. To explain, why returns to education of the non-backward castes are low, one has to look at the non-economic aspects of education. The non-backward castes, as we have seen, invest more in education than the backward castes, not necessarily anticipating higher economic returns to their

³¹ Refer to Chapter 7 for more evidence on cost aspects.

education. In fact, a part of their investment is consumption and motivated on cultural and status considerations. The non-backward castes might send their children to expensive schools to satisfy their cultural and status needs. In fact, some economists feel that 'education is increasingly becoming an item of wide cultural consumption' (Kothari 1967-a: 8), perhaps more so, in case of the non-backward castes.

Inequality in Human Capital Formation

INTRODUCTION

In the preceding chapter, we noted how the rates of return to education for any given level differed significantly from group to group. These inequalities in rates can be better understood, if we know about the inequality in human capital formed among these groups on the one hand, and discrimination in the job market on the other. It is important to note that while human capital is mainly assessed in terms of costs of education, discrimination in the job market reflects inequality in earnings. In this chapter, we shall focus on the analysis of inequality in human capital, and the subject of discrimination in the labour market will be discussed in the following chapter.

Educational levels attained by different groups of the population, by themselves, throw enough light on the problem of inequality in human capital formed. Years of schooling, although a necessary indicator of human capital, does not capture adequately the costs of schooling and the quality aspects of education. Therefore, our attempt here is to construct a comprehensive index of the stock of human capital, one which takes care of both qualitative and quantitative aspects of education. Though the concept of human capital is wider in scope than mere education, for lack of data we are constrained to restrict it to education only. Nevertheless, education is the largest source of human capital.¹ The index of human capital

¹ Human capital is formed through five important categories: (a) health, (b) on-the-job training, (c) formal education, (d) study programmes for adults including extension programmes, and (e) migration (Schultz 1961-a). Even though we confine

has been prepared for the State of Andhra Pradesh as our sample population for which the rates of return have been calculated belongs to this state. Two indices of the stock of human capital—*total* human capital and *active* human capital—were constructed. In the construction of the latter, leakages such as non-participation in the labour force, and unemployment, were taken into account. Before describing the method of construction and the results, it is in order to present a brief review of the studies on human capital in India.

A REVIEW OF LITERATURE

There are a few studies that contain estimates or indices of educational or human capital in India. Nallagoundan (1967) and Psacharopoulos (1973) estimated the stock of educational capital in India by considering the population and labour force at different levels of education and the unit costs of education. The latter were used as weights. The same method was adopted to construct an index of educational capital in India by Tilak (1979-b) and Manocha and Sharma (1979).² Harbison and Myers (1964) used arbitrary weights of 1 and 5 for populations at secondary and higher levels of education respectively, to construct an index of the human resource development for 75 countries in the world.³ On the other hand, Panchamukhi (1965) worked out the entire investment in education, including on-the-job training and called it educational capital in India. Barman (1979) also made similar estimates for the period 1960–61 to 1969–70.

According to Nallagoundan, the educational capital in the country in 1960–61 was to the tune of Rs. 73,343 million.⁴ It worked out to Rs. 167 per capita and Rs. 389 per member of the labour force. Panchamukhi's estimate of educational capital in India in 1959–60

ourselves to formal education, an important one of the eight forms of education Machlup (1962: 51) identified, we would be justified in using the term 'human capital' as 'education is unquestionably the largest source of human capital.' (Schultz 1968: 284.)

² See Chapter 2.

³ See Sen (1966) for a critique of the approach.

⁴ Nallagoundan made a backward projection of the population in 1950–51 and using the same costs estimated educational capital in 1950–51 as well.

was only Rs. 8,170 million. In per capita terms it was Rs. 19, and per member of the labour force it was Rs. 43. For the year 1960-61, Barman's estimate of educational capital was Rs. 12,440 million. Panchamukhi's and Barman's estimates were essentially estimates of the total investment in education in the country at different time periods. Methodologically, these two studies differed from the other studies, in that there was no reference to either population or labour force in these studies. It should be noted that perhaps this resulted in comparatively very low estimates of educational capital. According to the estimates of Psacharopoulos, the educational capital which is synonymous with our 'active human capital',⁵ was to the tune of Rs. 59,425 million in India in 1961. In per capita terms, it was Rs. 135 and per member of the labour force it was Rs. 315.⁶

THE METHODOLOGY

An attempt is made here to estimate the stock of total human capital in the State of Andhra Pradesh with the help of (a) the social costs of education as estimated in Chapter 4, and (b) population classified by educational levels as given in the 1971 Census for men, women and the total population; and for the backward and non-backward castes as given in the 1961 Census, the latter was used because the 1971 Census does not give a caste-wise break-up of the the population by educational levels. The method adopted can be briefly described as follows.

If P_{ij} represents the population with i -th level of education belonging to the j -th group, and C_{ij} represents per pupil social cost incurred on the j -th group for education up to the end of the i -th level, then the *stock of total human capital* embodied in the j -th group, THC_j , is given as follows:

$$THC_j = \sum_i P_{ij} C_{ij} \quad (7.1)$$

where $i = 1, 2, \dots, n$ educational levels;

⁵ See the following section in this chapter.

⁶ Psacharopoulos' estimates, which were in US dollars have been converted into Indian rupees at the then existing conversion rate, as given by Psacharopoulos himself (i.e., \$1 = Rs. 4.77).

and the *index* of the stock of total human capital (THCI) is given by the following equation:

$$THCI_j = \sum_i p_{ij} C_{ij} \quad (7.2)$$

where p_{ij} represents the proportion of population with i -th level of education, belonging to the j -th group to the total population of the same group.

The *stock of active human capital* embodied in group j , AHC_j and its *index*, $AHCI_j$ are, *mutatis mutandis*, given by the following equations:

$$AHC_j = \sum_i w_{ij} C_{ij} \quad (7.3)$$

$$AHCI_j = \sum_i w_{ij} C_{ij} \quad (7.4)$$

where W refers to the number of educated workers and w to the proportion of workers with a given level of education to the total number of workers.

If the population consists of, say, two groups, j and k , then the coefficient of inequality in the distribution of the stock of total human capital between the two groups is defined as

$$CITHC = (THCI_j / THCI_k) - 1 \quad (7.5)$$

If, however, inequality is to be measured in respect of active human capital, the coefficient of inequality, *mutatis mutandis*, is given by:

$$CIAHC = (AHCI_j / AHCI_k) - 1 \quad (7.6)$$

It may be noted that if the value of the coefficient of inequality is zero, it indicates perfect equality. And if it varies from zero, it indicates inequality between the two groups. Clearly, if the coefficient is positive it means that the distribution of the stock of human capital is skewed against group k , and if it is negative, it is skewed against group j .

The social costs of education for different groups of population were estimated and are presented in Chapter 6 for the year 1977-78. But data on population are available only for the census year 1971. Since population by educational levels is difficult to project for 1977-78, we have estimated the stock of human capital for 1971, by computing the social costs of education for the year 1971. This has been done by deflating the social costs of education for 1977-78 by

the All-India Consumer Price Index⁷ in order to arrive at the comparable cost for 1971.⁸

Following the formula (7.1), the value of the stock of human capital has been estimated for various groups of the population by levels of education. As for the distribution of the stock of human capital between the backward and non-backward castes, it could be estimated for the year 1961 only, as the 1971 Census does not give the break-up of either the population or the workers by caste groups and educational levels.⁹ Further, it may be noted that as the costs of education for each group have been estimated separately, the stocks of human capital based on these costs for any two groups, say, men and women, do not exactly add up to the total human capital stock for the population as a whole.

THE RESULTS

The results obtained following formulae (7.1) and (7.2) are presented in Tables 7.1, 7.2 and 7.3. It turns out that the value of the stock of total human capital in the State of Andhra Pradesh in 1971 was Rs. 25,896 million which works out to Rs. 595 per head of

⁷ The items that enter the educational industry and the items that enter the consumer price index, which is generally used for this purpose, are not the same or similar. Indeed, no price indices are available which properly correspond to the individual components of educational investments. This has been widely noted. See for example, Robbins Commission Report (1963). See Wasserman (1963) for one of the very few attempts of constructing a price index relevant for the educational sector. Generally, the All-India Consumer Price Index has been used whenever educational expenditures were to be expressed at constant prices in India (for e.g., Pandit 1972; Shriprakash 1978).

⁸ The All-India Consumer Price Index was 186 in 1970-71 and 192 in 1971-72. By the year 1976-77, it rose to 301 and was 324 in 1977-78 (*Economic Survey*: various volumes). Bi-annual averages have been taken in both cases and the Consumer Price Index in 1971 was less than the 1977 index by 39.52 per cent. Accordingly, the social costs for 1977-78 have been deflated by multiplying them with a factor of 0.6048 for arriving at the social costs for 1971.

⁹ In this case also, the social cost of education was deflated by the All-India Consumer Price Index. The Consumer Price Index was 124 in 1960-61 and 127 in 1961-62 (base: 1949), the average being 125.5. It shows that the 1961 index was less than the 1977 price index by 59.84 per cent. Accordingly, we deflated the 1977-78 social costs by multiplying them with a factor of 0.4016.

TABLE 7.1 Stock of Total Human Capital in Andhra Pradesh, 1971

<i>Educational Level</i>	<i>Population ('000s)</i>	<i>Social Costs of Education (Rupees)</i>	<i>Stock of Total Human Capital (Rupees in ten millions)</i>	<i>Index of the Stock of Total Human Capital</i>	<i>Per Cent</i>
(1)	(2)	(3)	(4)	(5)	(6)
Literacy	2,990	1,172	350.59	80.59	13.5
Primary	4,624	1,516	700.94	161.12	27.1
Middle	1,300	2,748	357.33	82.14	13.8
Secondary	1,141	4,728	539.19	123.94	20.8
Higher	231	27,754	641.54	147.47	24.8
All levels	43,503*		2,589.59	595.27	100.0
Per member of the labour force			Rs. 1,438.18		

Note : * includes illiterates.

TABLE 7.2 Stock of Total Human Capital by Sex in Andhra Pradesh, 1971

<i>Educational Level</i>	<i>Population ('000s)</i>	<i>Social Costs of Education (Rupees)</i>	<i>Stock of Total Human Capital (Rupees in ten millions)</i>	<i>Index of the Stock of Total Human Capital</i>	<i>Per Cent</i>
(1)	(2)	(3)	(4)	(5)	(6)
<i>Men</i>					
Literacy	187	1,666	312.26	141.88	12.9
Primary	3,051	2,167	660.96	300.31	27.3
Middle	839	3,575	299.96	136.29	12.4
Secondary	937	5,499	514.98	233.99	21.2
Higher	199	31,990	636.58	289.24	26.3
All levels	22,009*		2,424.74	1,101.72	100.0
Per member of the labour force			Rs. 1,892.78		
<i>Women</i>					
Literacy	1,116	924	103.06	47.95	16.7
Primary	1,573	1,233	194.03	90.27	21.4
Middle	461	2,876	132.66	61.72	21.5
Secondary	204	5,129	104.61	48.67	16.9
Higher	32	26,078	83.87	39.02	13.6
All levels	21,494*		618.23	287.62	100.0
Per member of the labour force			Rs. 1,245.66		

Note: * including illiterates.

population and Rs. 1,438 per member of the labour force. The stock of total human capital was highly unequally distributed among the various groups of population. For instance, the stock of human capital as embodied in the education of men was four times higher than in the education of women, although the total population was almost equally divided between men and women. In per capita terms, the difference is, more or less, of a similar order. The inequality was larger between the backward and non-backward castes. Since the populations of these caste groups were not equal, the respective stocks of human capital were not comparable. In per capita terms, however, the stock was more than seven times higher among the non-backward castes compared to the backward castes. These findings reinforce the well-known fact of inequality in the educational system.

TABLE 7.3 Stock of Total Human Capital by Caste Groups in Andhra Pradesh, 1961

<i>Educational Levels</i>	<i>Population ('000s)</i>	<i>Social Costs of Education (Rupees)</i>	<i>Stock of Total Human Capital (Rupees in ten millions)</i>	<i>Index of the Stock of Total Human Capital</i>	<i>Per Cent</i>
(1)	(2)	(3)	(4)	(5)	(6)
<i>Backward Castes</i>					
Literacy	322	524	16.89	26.82	54.2
Primary	143	704	10.08	16.01	32.2
Secondary	13	2,554	3.33	5.29	10.7
Diploma/certificate		4,433	0.10	0.16	0.3
Higher	1	14,671	0.79	1.25	2.5
All levels	6,298*		31.19	49.52	100.0
<i>Non-Backward Castes</i>					
Literacy	4,218	1,010	425.99	143.50	39.1
Primary	2,377	1,315	312.42	105.25	28.7
Secondary	457	3,859	176.28	59.38	16.2
Diploma/certificate	20	6,464	12.62	4.25	1.2
Higher	76	21,345	161.95	54.56	14.9
All levels	29,685*		1,089.26	366.93	100.0

Note: * includes illiterates.
negligible.

Viewed from the point of educational levels, the stock is distributed in favour of primary and literacy levels in all the cases. In fact, in respect of the backward castes, the two together account for 86 per cent of the total. The primary level accounts for about one-third of the total in all cases. The share of higher education in the total stock was one-seventh among women and the non-backward castes and one-fourth among men and the population as a whole. In contrast, it was just 2.5 per cent among the backward castes. The total human capital was less unevenly distributed between men at different levels than among women. In respect of caste groups, the stock was more unevenly distributed among the backward castes.

The estimates of the stock of active human capital are presented in Tables 7.4 and 7.5. In the State of Andhra Pradesh, the stock of active human capital was Rs. 14,389 million in 1971. It was Rs. 799 per person of the labour force. Its distribution was highly unequal between men and women. Whereas it was only Rs. 164 per member of the female labour force, it was as high as Rs. 1,330 per member of the male labour force, that is about eight times higher. It is worth noting that while in the stock of total human capital in the state, primary education had a major share, in the stock of active human capital, higher education had the major share—about one-third of the stock of active human capital followed by primary education.

This is because the relative share of higher educated workers in the total workforce is about double the relative share of higher educated population in the total population, whereas the relative share of primary educated in both cases is more or less the same.¹⁰ Among women, higher education accounted for 44 per cent of the total active human capital. Further, if one leaves aside the primary level, the share in active human capital stock increased with the level of education, as in the case of the stock of total human capital. This is primarily due to the fact that we find less and less number of people and workers at higher and higher levels of education.

Using formulae (7.5) and (7.6) the estimated coefficients of inequality are presented in Table 7.6. These figures clearly indicate that there exist wide inequalities in the stocks of total as well as

¹⁰ Higher educated people constitute 0.5 per cent of the total population whereas the higher educated workers constitute 0.95 per cent of the total work force. In contrast, the primary educated constitute 10.6 per cent of the total population, whereas primary educated workers form 12 per cent of the total work force.

TABLE 7.4 Stock of Active Human Capital in Andhra Pradesh, 1971

<i>Educational Level</i>	<i>Workers ('000s)</i>	<i>Social Costs of Education (Rupees)</i>	<i>Stock of Active Human Capital (Rupees in ten millions)</i>	<i>Index of the Stock of Active Human Capital</i>	<i>Per Cent</i>
(1)	(2)	(3)	(4)	(5)	(6)
Literacy	1,051	1,172	123.25	68.45	8.6
Primary	2,164	1,516	328.00	182.16	22.8
Middle	781	2,740	214.69	119.23	14.9
Secondary	629	4,728	297.45	165.19	20.7
Higher	171	27,754	475.49	264.07	33.1
All levels	18,006*		1,438.88	799.11	100.0

Note: * includes illiterates.

TABLE 7.5 Stock of Active Human Capital by Sex in Andhra Pradesh, 1971

<i>Educational Level</i>	<i>Workers ('000s)</i>	<i>Social Costs of Education (Rupees)</i>	<i>Stock of Active Human Capital (Rupees in ten millions)</i>	<i>Index of the Stock of Active Human Capital</i>	<i>Per Cent</i>
(1)	(2)	(3)	(4)	(5)	(6)
<i>Men</i>					
Literacy	988	1,666	164.64	128.50	9.7
Primary	2,044	2,167	442.76	345.58	26.0
Middle	744	3,506	265.84	207.49	15.6
Secondary	598	5,499	328.97	256.77	19.3
Higher	157	31,990	501.71	391.59	29.4
All levels	12,812*		1,703.91	1,329.93	100.0
<i>Women</i>					
Literacy	63	924	5.81	11.19	6.8
Primary	120	1,233	14.82	28.53	17.4
Middle	38	2,876	10.82	20.84	12.7
Secondary	31	5,129	15.85	30.52	18.6
Higher	14	26,078	37.80	72.78	44.4
All levels	5,194*		85.10	163.85	100.0

Note: * includes illiterates.

active human capital in the State of Andhra Pradesh between different groups of the population. In respect of the stock of total human capital, the extent of inequality generally increases with the level of education both for sex and caste groups. For every level of education, inequality in the caste groups is higher than in the sex groups.¹¹ Between the lowest and highest levels of education, the difference in inequality is far more in the caste groups than in the sex groups.

TABLE 7.6 Coefficients of Inequality in the Stocks of Human Capital

Educational Level	Coefficients of Inequality in the Stocks of		
	Total Human Capital		Active Human Capital
	By Sex	By Caste	By Sex
(1)	(2)	(3)	(4)
Literacy	1.96	4.35	10.48
Primary	2.33	5.57	11.11
Middle	1.20	10.25	8.96
Secondary	3.81	25.56	7.41
Higher	6.41	42.65	4.38
All levels	3.83	6.41	7.12

In contrast to the above, the coefficients of inequality by sex with respect to active human capital generally show an inverse relationship between inequality and the level of education. The value of the coefficient declines from 10.48 at the literacy level to 4.38 at the higher level. This means that the embodiment of human capital in the female labour force is relatively better at higher levels of education compared to the lower levels.

CONCLUSIONS

In this chapter an attempt was made to explore inequality in the stocks of human capital among different groups of the population in the State of Andhra Pradesh. For this purpose, stocks of total and

¹¹ Even though they refer to different time periods, we feel that our statement, more or less, holds true.

active human capital were estimated which formed the basis for estimating the inequality coefficients. The main conclusion that emerges from our analysis is that great inequalities exist in the distribution of the stock of total as well as active human capital between various groups of the population in the state. The distribution is highly biased against women and the backward castes. As regards the distribution of the stock by levels of education, whereas the share of primary education in the stock of total human capital is relatively higher when compared with other levels of education, the share of higher level education was above that of other levels in the stock of active human capital. This can be explained in terms of the distribution of the population and work force by educational levels.

Perceived from another angle, inequality in the distribution of the stock of human capital means underinvestment on the one hand, and mal-investment on the other, as total and per capita stocks of human capital figures in the case of women and the backward castes indicate. Perhaps, the main reason for this lies in the failure of the 'human investment revolution in economic thought' to really revolutionise common thinking. Individuals as well as State policy-makers still perceive expenditures on education as consumption. Policy-makers consider expenditures on schooling as welfare expenditure, as a 'burden' on the state, which reduces public savings. This appears to be more so in the case of expenditures on the education of the backward castes and women. This, indeed, is a serious error. As Schultz (1981: 15) rightly pointed out, 'it is misleading to treat public expenditures on schooling as "welfare" expenditures and as a use of resources that has the effect of reducing "savings"'. For the same reason, expenditure on education 'does not find a place in the data on capital formation in national accounts' (Rao 1983: 163). Such an error of attitude, in fact, even results in an underestimation of savings, investment and capital stock in India.¹²

Our educational system itself has a strong built-in institutional component which discriminates against particular classes of people. Discrimination in schools can be traced back to social discrimination. This legacy of discrimination in schools along with discrimination at home and in the labour market has been responsible for a high

¹² See Sharma and Ram (1974) and Ram and Schultz (1979-a and 1979-b).

degree of underinvestment in the education of the weaker sections.¹³ Another important reason for such underinvestment is economic. Poverty and underdevelopment of the nation do not permit adequate investment in general, including in education. From the private angle, the weaker sections, who should invest more in education, if poverty and inequality were to be reduced, in fact, invest substantially less because their present consumption is more important for their survival.¹⁴ Also, the capital market in India is too poorly organised to provide any funds to the people for investing in education. Even if people are able to borrow money, they prefer investment in tangible and resaleable assets which yield high returns in short gestation periods to investment in human capital.¹⁵ The state is constrained by its available resources on the one hand, and by its welfare expenditure approach to education on the other.

Thus, to bring equity in the distribution of human capital between different groups of the population, serious efforts should be made towards reducing discrimination in schooling, improving equality of educational opportunity, reducing discrimination in the labour market, besides economic uplift of the weaker sections and efforts to drastically revolutionise the thinking and attitudes of individuals as well as policy-makers towards education.

Before we conclude, we should briefly note the limitations that our results carry with them. While estimating the stock of physical capital, an allowance is generally made for depreciation. But while estimating the stock of human capital, we do not make any such allowance for depreciation because, while the rental value of physical capital like machines continues to decline over its working life, the earnings of an educated person, in general, go on increasing as human beings learn by experience. It may be argued that educated individuals may also suffer from depreciation in the form of obsolescence of knowledge. But in a developing country like India such a situation is least likely to occur. Further, while interpreting the results, a limitation that should be borne in mind is that part of the costs of education computed on the basis of our sample survey

¹³ See Schultz (1967-b: 12) for similar arguments about the US educational system.

¹⁴ See Thurow (1969: 84-86).

¹⁵ See Ribichi (1968: 3-4) for more details. See also Tilak (1980-a) for several reasons for lower investment in human capital.

that were used to estimate the stock of human capital in the state, are not necessarily representative for the state as a whole. The district selected for this survey, West Godavari is relatively better placed in terms of economic conditions,¹⁶ although the distribution of income in this district is not very much different from the state average.¹⁷

¹⁶ NCAER (1962-b) ranked the districts of the state into three categories based on income; West Godavari District falls into the top category according to it.

¹⁷ The district ranks twelfth among the twenty-one districts of the state in respect of rural and eighth in respect of urban consumption expenditure, including expenditure on education. See Sastry (1978) for more details.

Economics of Discrimination in the Labour Market

INTRODUCTION

We will now turn our attention to the issue of discrimination in the labour market in the State of Andhra Pradesh. The study of discrimination in the labour market can be traced back to John Stuart Mill (1869). However, Edgeworth's (1922) work marks the beginning of a more systematic study of the problem. The study of discrimination in the labour market is important not only because it explains lower earnings among the weaker sections, viz., backward castes and women, but also because it enhances our understanding of the role of education as a policy instrument for achieving the goal of economic equity. If discrimination reduces the rates of return to education and persists in a severe form, then education could prove to be a poor instrument for achieving this goal¹ and it calls for anti-discrimination policies.

We shall confine our discussion to two important forms of discrimination which significantly influence the rates of return to education: wage discrimination and employment discrimination. In the following section, an appraisal of the forms and theories of discrimination has been done. This is followed by a description of the methodology of measuring the extent of discrimination, and the empirical findings on the subject.

¹ See Thurow (1969) and OECD (1975).

AN APPRAISAL OF THE FORMS AND THEORIES OF DISCRIMINATION IN THE LABOUR MARKET

If two groups of labour force are differentiated in the labour market on the basis of some characteristics, irrelevant to any objective measure of productivity, then we say that there exists discrimination in the labour market. *Employment discrimination* occurs when employment to one group is provided but is restricted to the other group, based on productivity irrelevant characteristics of workers. Similarly, *wage discrimination* is said to occur when differences in wages are not based on productivity differences. The characteristics on which labourers are discriminated can be differences in race, caste, sex, ethnic origin, place of birth, etc.

There are a number of theories of discrimination in literature.² According to Becker (1957) the 'employers' taste for discrimination' results in discrimination,³ whereas Thurow (1969) and Bergmann (1971) believe that it is not the employers' taste for discrimination, but the power of the dominant group in the community that makes discrimination possible. For instance, discrimination against the blacks in the United States is possible only because the whites act collectively as a rational monopolist (or as cartel) in their dealings with the blacks.⁴ The other group of theories known as group-conflict or bargaining theories owe their origin to Marxian economists like Baran and Sweezy (1966) who believe that discrimination is possible because of differences in the bargaining strength of several unions.⁵

Discrimination may occur even before people enter the labour market. Such discrimination generally affects the quantity and

² See Birdsall and Sabot (1984) for a recent collection of studies on discrimination in the labour market. See also Gunderson (1978), Stains *et al.* (1976) and Thurow (1975) who made a variety of classifications of the types and theories of discrimination. See also Masters (1975), Marshall (1974), Arrow (1972), Cain (1976), Lundahl and Wadensjo (1984), Jain and Sloane (1981) and McNabb (1985) for surveys of economic theories of discrimination.

³ For a critique of Becker, see Krueger (1963), Welch (1967), and Arrow (1972). See also Davis and Morrall (1974) and Butler (1982).

⁴ See Kain (1969) and Freeman (1973) who also belong to the same group.

⁵ Silver (1968), Gordon (1972), Bowles and Gintis (1975) and Marshall (1974) can also be included in this group.

quality of schooling of a child, his paths to future occupation, his training and earnings. This has been referred to as 'discrimination before the market' or 'discrimination among children'.⁶ Discrimination before the market 'denies those who are discriminated against the same opportunity as others have to develop their capability and use so much a capability as they do develop in the most advantageous employment for which it qualifies them' (Brown 1977: 145). Thus, discrimination may also occur in the upbringing of children by way of differential provision of social services like education, health, nutrition, etc.⁷ The second category of discrimination takes place within the market, i.e., among those who have already entered the labour market.⁸ This category of discrimination may be made at the time of entry of persons into the job market, and later in occupations and in wages. In any case, discrimination may be made by reference to differences in status—caste, sex, religion, region and community status, showing a psychic bias against members of the labour force of less preferred status, or by entertaining a notion that people of lower status should be given a low level of treatment, or by having misconceptions that persons of the less preferred groups possess low level abilities as employees. On the whole, both prior-market discrimination and present-market discrimination along with non-market discrimination produce occupational, employment and wage discrimination which further result in inequality in earnings,⁹ and all this can be called 'social discrimination' (Balligmeir 1985).

THE METHOD OF MEASURING DISCRIMINATION

Measurement of discrimination is not an easy task, because differences could exist due to a variety of factors. Boulding has (1976) rightly observed:

⁶ Some prefer to call it 'cumulative discrimination' (Madden 1975).

⁷ These are respectively known as indirect and direct discrimination (Chiswick 1985). Inter-links between several stages of discrimination were highlighted by several researchers. See, for example, Duncan *et al.* (1972). Also see Tilak (1979-a) with respect to India.

⁸ Some researchers (Chiswick and O'Neill 1977) prefer to call these two types of discrimination 'past' and 'present' discrimination respectively.

⁹ See Schiller (1980: 161–62).

Discrimination is a phenomenon which is so pervasive in all human societies that there is no doubt at all that it exists. It is not, however, a unitary phenomenon but a complex of a number of related forms of human behaviour, and this makes it not only hard to define but frequently difficult to comprehend fully.

We have identified for our purpose two forms of discrimination.

Employment Discrimination

Depending upon the criteria adopted for defining the state of unemployment, the rate of unemployment is estimated in different ways in literature. For instance, Raj Krishna (1976) proposed four criteria in this connection, viz., (i) time criterion (working time less than some normal standard), (ii) income criterion (income or consumption less than some normal standard), (iii) willingness criterion (willingness to do more work), and (iv) productivity criterion (productivity less than some normal standard).¹⁰ It is quite probable that these four criteria produce four different estimates of unemployment. The Census of India named unemployed and seeking employment as 'other' non-workers.¹¹ If one adopts this concept of unemployment, as given by the Census of India, the rate of unemployment can be defined as the percentage proportion of 'non-workers' categorised as 'others' in the Census classification to the total labour force, the total labour force being defined as the sum of workers and non-workers seeking work and classified as 'others'. Thus, the rate of unemployment among the j -th group of workers with m -th level of education,

$$u_{jm} = [U_{jm} / (W_{jm} + U_{jm})] \cdot 100 \quad (8.1)$$

where u is the percentage rate of unemployment, U the non-workers categorised as 'others', and W the total workers.

Thus, by adopting the definition of unemployment as given by the

¹⁰ See also Raj Krishna (1976) for a survey of various concepts and estimates of unemployment in rural India.

¹¹ 'A boy or a girl who has completed education or has stopped studying, and is seeking work' would come under the category of 'others' among non-workers. 'Persons, irrespective of age and whether educated or not, if he reports that he is not engaged in any other activity but is seeking work' comes under this category (*Census of India, 1971*).

Census of India, and based on data collected from the Census of India, 1971 relating to the State of Andhra Pradesh, we estimated the coefficients of employment discrimination.

If u_j and u_k represent the rates of unemployment of two different groups j and k in the labour force respectively which face discrimination, and u^*_j and u^*_k represent the rates of unemployment of these two groups in the absence of discrimination in employment, then the coefficient of discrimination in employment, D_e can be defined as follows:

$$D_e = (u_j / u_k) - (u^*_j / u^*_k) \quad (8.2)$$

If groups j and k are not perfect substitutes, the rates of unemployment may as well differ even in a non-discriminatory situation. But, if they are assumed to be perfect substitutes, the difference in their rates of unemployment amounts to discrimination. In the absence of discrimination the rates of unemployment, i.e., u^*_j and u^*_k would be equal. Hence, with groups j and k being substitutes, equation (8.2) will take the form:

$$D_{em} = (u_{jm} / u_{km}) - 1 \quad (8.3)$$

where m stands for the level of education. It should be clear that if D_e is positive, it means that the discrimination is against group j , but when it is negative, discrimination is against group k . If, on the other hand, there is no discrimination, u_j will be equal to u_k and D_e will be equal to zero. The assumption that the two groups of population are perfect substitutes in the labour market would be more justified, if the two groups are homogeneous with respect to certain characteristics like education, age, etc. The available data, as we shall see, enable us to treat sex and caste groups as homogeneous with respect to education only.

Wage Discrimination

The yardstick of money in the form of monetary wages or earnings may provide a better operational and quantifiable concept of discrimination. Further, such a monetary approach serves better to the extent that it incorporates all aspects of discrimination including past discrimination. Analogous to the coefficient of employment discrimination, therefore, is the coefficient of wage discrimination,

as defined by Becker (1957). The coefficient of wage discrimination, D_w , is defined, *mutatis mutandis*, as:

$$D_{wm}^n = (E_{jm}^n / E_{km}^n) - 1 \quad (8.4)$$

where E_j and E_k refer to the mean annual earnings of groups j and k respectively, m to the educational level and n to the age group. A positive value of D_w indicates that wage discrimination is against group k whereas a negative value indicates that it is against group j .

It is important to note here that all the observed differentials in earnings between different groups of workers may not be attributable to discrimination alone. Factors like experience, investment in human capital, for example, quantity and quality of schooling, medical care, occupation, and place of occupation, may result in earnings differences. As explained earlier, differences in several of these factors may be due to past discrimination, in which case we would be justified to attribute almost all the earnings differentials to overall discrimination—current and past.¹² The earnings differentials may also be the result of 'more subtle and complex factors originating in cultural patterns that have grown up in most societies through the centuries' (Chiswick and O'Neill 1977: 138). Several studies, cited later in the text¹³ indicate that even after adjusting for factors like productivity, a substantial part of the differential still remains unexplained and can be attributed to 'present' discrimination, the origin of which lies ultimately in the historical and cultural patterns.

THE RESULTS

Employment Discrimination

We have estimated the unemployment rates and the coefficients of discrimination in employment, on the basis of data available from the Census of India, 1971 reports for Andhra Pradesh. Since census reports do not give the break-up of the labour force by educational levels and by caste groups, we are not in a position to study employment discrimination by caste groups. We have, therefore, confined our

¹² See Welch (1967) for similar arguments.

¹³ See footnote 25.

investigation to employment discrimination by sex alone. Discrimination by sex is reinforced in our society, mainly because the female labour is usually immobile and their labour supply curve is relatively inelastic. Lack of enough suitable employment opportunities for women fosters sex discrimination further. The working life patterns of men and women are divergent. A man can be continuously in the labour force for an unbroken period of 35–40 years. For women, this continuity in work force is rare. Their working life is frequently interrupted, sometimes for several years, mainly because of the uneven pressures of home responsibilities, periods of child-bearing, etc. Hence, *a priori*, employers expect, on an average, lower performance from women than from men and accordingly discriminate against the former.

The relevant rates of unemployment for men and women and the coefficients of employment discrimination against women in Andhra Pradesh, following equations (8.1) and (8.3) are presented in Table 8.1. It is clear that there exist increasingly large proportions of unemployed in the labour force at each successively higher level of education among women as compared to men, the highest being at the secondary level. The incidence of unemployment is less than 2 per cent at below primary levels of education. It is about 6 per cent at secondary and higher levels among men, while among women, it is 12 and 9 per cent at secondary and higher levels respectively. At the illiteracy level and due to that at the aggregate level, the rate of unemployment among women is less than that among men. The coefficient of employment discrimination is positive at all levels of education, thereby indicating discrimination against women among the educated category of workers. Though all the coefficients are positive, there seems no systematic pattern of discrimination.¹⁴ However, among the formally educated, discrimination against women is minimal at the highest level¹⁵ and maximum at the literacy level. The negative value of the coefficients at the illiteracy level, and due to the predominance of illiteracy at the aggregate level, implies discrimination against men. However, in interpreting this result, it is important to bear in mind that all this is not market

¹⁴ The correlation coefficient between years of schooling and discrimination coefficient is 0.48. However, it is not statistically significant at 10 per cent level.

¹⁵ See Tilak (1984-b) for unemployment rates by sex at higher level by faculties in India.

TABLE 8.1 Coefficients of Employment Discrimination in Andhra Pradesh by Sex, 1971

(1)	Men				Women		Coefficient of Employment Discrimination (8)
	No. of Unemployed (2)	Total Labour Force (3)		Per Cent Rate of Unemployment (4)	No. of Unemployed (5)	Total Labour Force (6)	Per Cent Rate of Unemployment (7)
Illiteracy	16,726	8,298,566		0.20	6,357	4,933,804	0.13
Literacy	5,000	993,449		0.50	725	63,592	1.28
Primary	14,113	2,054,916		0.69	1,212	121,383	0.46
Middle	20,963	764,552		2.74	1,866	39,488	0.73
Secondary	39,121	637,391		6.14	4,105	35,019	11.72
Higher	10,324	167,158		6.18	1,381	15,874	8.70
Total	106,248	12,918,733		0.82	15,646	5,209,160	0.30
							-0.35
							1.28
							0.46
							0.73
							0.91
							-0.37

Source: Based on Census of India, 1971.

discrimination in the sense of employers discriminating among labourers. In a country like India, particularly in rural areas and in agriculture including allied activities, employment is predominantly self-employment in family units.

Occupational Concentration

In this context, it is relevant to examine the occupational concentration of workers since occupational concentration and segregation indicate underutilisation or mis-utilisation of the talent and resources in the economy. Concentration of workers as between men and women in Andhra Pradesh, based on the 1971 Census, is given in Table 8.2. It can be seen from this table that a vast majority of women workers with middle, secondary and higher levels of education are engaged in the service sector other than trade, commerce and transport. In fact 84 per cent of women workers with secondary education and 91 per cent with higher education are employed in this sector. At the other end, a great majority of women workers with no education or lower levels of education are engaged in agriculture and allied activities either as agricultural labourers or cultivators. Thus 85 per cent of the illiterate, 66 per cent of the literate and 72 per cent of women workers with primary education are engaged in this sector compared to 81, 55 and 57 per cent of men workers in the respective categories. Although the picture of occupational concentration is similar for both men and women, concentration is far greater in respect of women in the service sector, specially above the middle level of education. It is at these later levels, that the discrimination coefficient should be indicative of market discrimination, because it is at these levels that women seek out and compete with men for private and public sector jobs. At lower levels of education, the coefficients are indicative more of cultural and social rather than labour market discrimination, because at these levels family-based self-employment is a predominant phenomenon. Thus, on the whole, we see that while occupational pattern at lower levels of education can be traced to social and cultural discrimination, at higher levels of education, it can be traced to labour market discrimination. Occupation-wise, agriculture and allied activities, which are predominantly of the nature of self-employment and carried along traditional lines, have scope for social and cultural discrimination against women. In

modern secondary sectors like manufacturing and construction and also in the tertiary sector of services, discrimination is more due to employers' preferences in the labour market. Indeed, these diverse factors which produce discrimination seem to be responsible for the unsystematic pattern of the coefficients of discrimination given in Table 8.1.¹⁶ However, it is necessary to note, specially in the case of women, that preferences, cultural patterns and other factors such as domestic pressures and customs tend to maintain occupational concentration of men and women in particular categories of occupations and, in turn, result in employment discrimination.

TABLE 8.2 Occupational Pattern of Workers by Sex in Andhra Pradesh, 1971
(per cent)

Educational Level	Occupational Category				
	O_1	O_2	O_3	O_4	All
(1)	(2)	(3)	(4)	(5)	(6)
<i>Men</i>					
Illiteracy	81.13	9.57	4.72	4.58	100.0
Literacy	55.43	20.22	15.26	9.08	100.0
Primary	56.62	18.90	16.35	8.13	100.0
Middle	41.77	12.81	27.08	18.35	100.0
Secondary	23.00	12.47	25.58	38.95	100.0
Higher	6.45	36.92	0.02	56.40	100.0
All levels	69.32	12.55	9.59	8.54	100.0
<i>Women</i>					
Illiteracy	85.14	7.42	2.67	4.77	100.0
Literacy	66.64	18.10	6.89	8.44	100.0
Primary	71.73	15.27	5.72	7.28	100.0
Middle	28.35	10.31	3.77	57.56	100.0
Secondary	3.00	5.00	6.92	84.41	100.0
Higher	0.28	4.17	4.09	91.26	100.0
All levels	83.47	7.73	2.83	5.97	100.0

Notation: Occupational Groups:

O_1 – cultivators, agricultural labourers, livestock, etc.

O_2 – mining, manufacturing and construction activities.

O_3 – trade, commerce and transport.

O_4 – other services.

Source: Based on the 1971 Census data for the State of Andhra Pradesh.

¹⁶ See Stevenson (1975) and Brown *et al.* (1980) for a description of the mutual interaction between occupational concentration and wage differentials.

Coefficients of Wage Discrimination

We estimated the coefficients of wage discrimination between sex and caste groups, following formula (8.4), for each of the twelve age groups and ten educational levels, using the average age-education earnings profiles. In both cases, a positive value of the coefficient implies discrimination against the weaker sections—women and the backward castes.

Wage Discrimination by Sex: The coefficients of wage discrimination by sex are presented in Table 8.3. It can be seen that most of the coefficients are positive which indicates that women are extensively subjected to wage discrimination. In cases where the value of the coefficient is greater than one, there is severe discrimination in respective age groups and educational levels. This is seen at the higher age groups among the illiterates and workers with middle or lower than middle level education. Remarkably, the coefficients are as high as 5.878 at literacy and 4.28 at illiteracy levels in the age group of 46–50 years. On the whole, discrimination is relatively less at higher general and higher professional levels of education.¹⁷ These coefficients being negative, though small, indicate that women are marginally better placed in their earnings at these levels. The correlation between the coefficients of wage discrimination and years of schooling, though small, is negative (-0.3736), indicating thereby that education reduces the scope for discrimination against women,¹⁸ perhaps through improved participation in the labour force (Shields 1985). With a few exceptions, we find an increasing trend in the value of the coefficients of wage discrimination as individuals belonging to a given level of education grow older and this trend continues almost up to the end of active working life. This could be the lagged effect of past discrimination. However, the relationship between the two—age and coefficients of discrimination—is very weak. The simple coefficient of correlation is as low as 0.1446 and is not significant. This trend, however, can be understood in the framework of our social system. At higher age levels, because of marriage, child-bearing and domestic responsi-

¹⁷ A majority of the sample population relating to women at the higher professional level consists of doctors.

¹⁸ Brown (1977) arrived at a similar conclusion in the case of England.

bilities, the ability for wage work among women diminishes; and correspondingly their earnings also decline. In fact, women themselves may accept such discrimination based on their sex roles.¹⁹ As Chiswick and O'Neill (1977: 138) have pointed out, in almost all the societies 'the possibilities open to women are restricted, they are not always free to contribute a full measure of earnings to their families, to develop their talents fully, or to help achieve the national goal of "maximum production"'. All these factors have a direct impact on productivity and may explain the inequality in earnings to some extent.²⁰ But a substantial part of the inequalities in earnings may be primarily due to deliberate present discrimination in the labour market, which might be based on *ex-ante* expectations of women's productivity trends.

Wage Discrimination by Caste: The coefficients of wage discrimination by caste group are presented in Table 8.4. It may be noted that except in a few cases, the coefficients of discrimination are positive, indicating that there is extensive discrimination in wages against the backward castes. In some cases specially at the higher age levels and higher levels of education the coefficients are greater than one and as high as 2.07 at the II degree (general) level in the age group 56 and above. This indicates the existence of severe discrimination at these levels. The negative discrimination coefficients, implying discrimination against the non-backward castes, are very few and generally low in magnitude. The value of such coefficients varied from 0.01 to 0.51 while the value of positive coefficients ranged from 0.02 to 2.07, suggesting that wage discrimination works against the backward castes. When we study the coefficients by age group for all levels of education grouped together, we find that the value of the coefficient rises with age, thus indicating greater discrimination at later ages, as seen in the case of wage discrimination by sex. But on comparison, the relationship in this case is stronger, the correlation coefficient being 0.7251.²¹ The correlation coefficient between educational levels and discrimination

¹⁹ See Gunderson (1978) for more details.

²⁰ See also Birdsall and Fox (1985) and Oaxaco (1985).

²¹ This conclusion is in conformity with the findings of Welch (1975), Link and Ratledge (1975), Link *et al.* (1976) and Smith and Welch (1977). However, there is evidence to the contrary in literature. See, for example, Akin and Garfinkel (1980).

coefficients by caste, though small (0.31), is positive unlike in the case of women. On the whole, the degree of discrimination between caste groups is lower than that against women.

TABLE 8.3 Coefficients of Wage Discrimination by Age and Educational Levels (by Sex)

Age Group	Educational Level					
	E_0	E_1	E_2	E_3	E_4	E_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
8-10	.4666	—	—	—	—	—
11-13	.1160	.1063	Zero	—	—	—
14-18	.2888	Zero	.4779	-.0344	.0759	—
19-21	.3854	Zero	.2851	Zero	-.1359	.5138
22-25	.6863	.0140	.0784	-.0634	-.0826	.0478
26-30	-.2739	.0666	.3791	-.1094	.0446	.0524
31-35	.2075	.9375	.4368	-.1933	.3084	-.0137
36-40	.7578	.8322	.1564	.1182	.1230	.5738
41-45	.1394	1.2581	1.0961	-.1541	.0461	.2072
46-50	4.2811	5.8780	.4500	.0197	.0706	Zero
51-55	Zero	Zero	.5333	.3943	.4017	.2500
55+	.7318	.1981	1.3120	1.4345	-.0403	.0671
All age groups	.3016	.9047	.4788	-.0815	.1334	.2270

Age Group	Educational Level				
	E_6	E_7	E_8	E_9	All levels
	(8)	(9)	(10)	(11)	(12)
8-10	—	—	—	—	.4667
11-13	—	—	—	—	.0683
14-18	—	—	—	—	.0605
19-21	—	—	—	—	.1340
22-25	.1035	.0829	.0943	.4280	-.0006
26-30	.0407	.0485	.0434	-.1187	.1213
31-35	.3159	.1161	.1962	-.0352	.3574
36-40	Zero	.0177	.0850	-.4167	.4811
41-45	.6360	Zero	.3274	Zero	.0893
46-50	Zero	Zero	Zero	-.0358	.4317
51-55	.9559	.4638	.5923	-.0935	.3010
55+	.0274	.8872	.1654	.2813	-.1880
All age groups	.3871	.2470	.3028	-.1302	.2745

Notation: See Table 6.1.

TABLE 8.4 Coefficients of Wage Discrimination by Age and Educational Levels (by Caste)

Age Group	Educational Level					
	E_0	E_1	E_2	E_3	E_4	E_5
(1)	(2)	(3)	(4)	(5)	(6)	(7)
8-10	.0233	—	—	—	—	—
11-13	.0657	.1063	.5000	—	—	—
14-18	.3533	.4000	.0750	.7928	.9111	—
19-21	1.0444	Zero	.2493	.2228	.0310	-.1864
22-25	1.1544	.0782	.2561	.0816	.1727	.1161
26-30	.8337	.1627	.0809	.1472	.2032	.1157
31-35	.2075	.2900	.3418	.4002	.1841	.1000
36-40	.3720	.6793	.0150	.0265	.1149	-.3115
41-45	.1111	.6194	-.2398	.0171	-.0585	.2875
46-50	-.5102	-.2253	.1150	.0285	.0162	.1509
51-55	.2993	.4271	.0945	.3414	.2698	.0294
56 and above	.5363	.3461	1.0697	.8742	1.4842	1.0510
All age groups	-.0517	.1316	.2180	.1107	.0912	.0305

Age Group	Educational Level				
	E_6	E_7	E_8	E_9	All levels
	(8)	(9)	(10)	(11)	(12)
8-10	—	—	—	—	.0233
11-13	—	—	—	—	.1667
14-18	—	—	—	—	.8034
19-21	—	—	—	—	.5775
22-25	-.0861	.0292	.0180	.0509	.5132
26-30	.4349	-.1030	.3341	-.1471	.4849
31-35	-.1612	.3053	-.0108	-.0470	.3836
36-40	.2200	-.2052	-.2135	.3766	.2693
41-45	.3041	-.4455	.0761	1.4000	.3129
46-50	1.4444	.2343	.6543	.1666	.9115
51-55	.3414	.7810	.4887	-.1966	.8248
56 and above	1.2954	2.0713	1.5348	1.4919	1.8797
All age groups	.2483	.0605	.1716	.1467	.4609

Notation: Same as Table 8.3.

CONCLUSIONS

To sum up, we can say that the incidence of unemployment is higher among women than among men at every level of education. This can be attributed to lack of adequate and suitable employment opportunities for women and deliberate discrimination in the job market against women, which may be based on false or real notions of women's productivity, or simply the result of prejudice against women. Whereas the existence of discrimination is well established by the estimated values of the discrimination coefficients, no systematic pattern could be found in employment discrimination by levels of education. The discrimination against women at lower levels of education might essentially indicate social and cultural discrimination, whereas at higher levels of education, labour market discrimination appears to be more important.

There is substantial discrimination in the labour market in the form of wage discrimination against the weaker sections—women and the backward caste workers. The value of the discrimination coefficient varies from one educational level to another and from one age group to another. A decline in the value of the discrimination coefficient is observed with an increase in the educational level of women.²² However, the case of discrimination by caste group does not establish any clear relationship in this regard. There is a strong relationship between age and discrimination in the case of the backward castes. Further, at every age level, discrimination in wages by caste groups is found to be higher than discrimination by sex groups.

It has also been found that the coefficients of employment and wage discrimination move, in general, in the same direction indicating that women are discriminated against in both cases. Theoretically, in the market economy context, if there are measures to control wage discrimination, this may lead to higher discrimination in employment, and if there are effective measures to control employment discrimination it may lead to higher discrimination in wages.²³ In such circumstances, one may expect an inverse relationship

²² See Filer (1983) for comparable results.

²³ Precisely for this reason, Becker (1968: 209) observes: 'Some of the worst economic discrimination as well as other kinds, is directly traceable to government action.'

between employment discrimination and wage discrimination. On the other hand, the relationship between the coefficients of employment and wage discrimination may be positive, if there are no effective measures to control either forms of discrimination, or if there are highly effective measures to reduce both. In the light of these observations, a positive relationship between the two coefficients of discrimination in our case seems to prove that the job reservation policies and anti-discriminatory measures in wages are not fully effective.

While the above results undoubtedly establish the existence of discrimination, it should be made clear that our estimates of the coefficients of wage discrimination are based on the assumption that all the earnings differentials are attributable to discrimination. In reality, there may be several factors which may result in earnings differentials such as productivity and occupational differences, place of occupation, nature of occupation, market imperfections, trade union behaviour, and minimum wage or equal pay legislation. Further, immobility of labour, more specifically with respect to women, may result in relatively higher unemployment and low wages, which cannot be treated as market discrimination.²⁴ In this study we could not make adjustments for these factors because of lack of reliable data. One may argue that there exists no wage discrimination in the public sector, and hence our coefficients are underestimates for the market regulated private sector for which the coefficients of wage discrimination would indeed be higher. On the whole, our estimates can be treated as 'gross' coefficients of discrimination. However, it is worth noting that adjusting the coefficients on the grounds of productivity, experience, etc., is 'proposing as causes what are in fact results of wage and employment discrimination' (OECD 1979: 76).²⁵

²⁴ However, some of the factors may produce some forms of discrimination—non-market and/or prior-market discrimination.

²⁵ Even after adjusting for productivity differences, a substantial part of the earnings differentials can be attributed to pure discrimination. For e.g., Usha (1981) found that about 40 per cent of the earnings differentials in India can be attributed to discrimination. Blinder (1973) and Allison (1976) found that about one-third of the earnings differentials can be attributed to discrimination. While the proportion of the earnings differentials attributable to discrimination is one-fifth according to Chiswick and Saadar (1971) (quoted in OECD 1979), it is three-fourths according to Holmes (1976). However, it is generally felt that not less than 50 per cent of the

The policy implications of discrimination are varied. Radical theorists like Baran and Sweezy, Gordon, and several others believe that the replacement of the market regulated capitalist system by some radical socialist alternative is the only solution. From Becker it follows that discrimination can be removed primarily by changing the employers' tastes for discrimination and, secondly, by making the labour market more competitive.²⁶ In the same line, economists like Thurow argue that as discrimination rests on monopoly and monopsony powers, for instance, of the Whites in the United States, it can be fought by breaking these monopoly and monopsony powers in business institutions, trade unions and the government by making the economy highly competitive.²⁷ However, Arrow (1973) and Phelps (1972) opine that the dissemination of proper information might reduce wage discrimination.

In our view, to be concerned with discrimination in the labour market alone is not sufficient. As already noted, discrimination in schooling, health and basic amenities like sanitation and housing, has a direct bearing on discrimination in employment and in wages. Hence, a multi-front attack on discrimination implies fundamental changes in the social, economic and political structure of the country. If discrimination is sought to be eliminated by legislative measures alone without changes in the socio-economic and political structure of the country, the burdens of unemployment, low pay, and unsatisfying work, which have traditionally fallen more heavily on the weaker sections, will probably just get redistributed among all workers. The social conflict generated by this shift would be considerable, and it could as well lead workers of all sections to question the system that deprives a large proportion of the population of satisfying work and a decent standard of living for the benefit of a few.²⁸

differentials should be ascribed to wage discrimination. See also Ferber and Kodick (1978), Long (1976), Goldfarb and Hosek (1976), Malkiel and Malkiel (1973), etc. Hence, the coefficients adjusted for no single factor can be treated as 'gross' coefficients of discrimination.

²⁶ See also Friedman (1965: 109-10).

²⁷ It could also be argued that an increase in investment in the education of, say, Whites in the United States might reduce discrimination against the Blacks, because, once the Whites have been educated, their taste for discrimination might decline. See Davis and Morrell (1974: 61-62).

²⁸ See Simmons *et al.* (1975) for more details.

In this and the preceding chapter, it was intended to provide an explanation of the observed inequalities in the rates of return to education presented in Chapter 6.

In Chapter 7 it was observed that investment in education of both groups of weaker sections, viz., women and the backward castes was, in general, substantially lower than in the case of men and the non-backward castes. Thus, when the investment or costs of education are less, one would expect higher rates of return, given that earnings are the same. However, in this chapter it was noted that these two groups of weaker sections are subject to wage discrimination. When the earnings of a group of workers are lower than the earnings of the other group, one would expect lower rates of return to their education, given that costs are the same. But we have already observed that in general, the rates of return to education of the backward castes are higher than those of the non-backward castes, and the unadjusted rates of return to education of women are higher than those of men, even though the adjustments finally reversed the latter position. Even though the earnings of the backward caste workers are less than the earnings of the non-backward castes, the rates of return to their education are higher mainly because the costs of education of the backward castes are substantially lower in comparison. The same applies to the unadjusted rates of return to education of women. Despite the fact that women are subject to wage discrimination, their lower costs of education result in higher rates of return.

To conclude, despite labour market discrimination in earnings, the backward castes and women, in general, carry higher rates of return to education mainly because of substantially lower levels of investment in their education compared to that of the non-backward castes and men. Thus, from the economic efficiency point of view (the rate of return to education) and equity point of view (human capital and discrimination in the labour market), the study reaches a unanimous conclusion suggesting more investment in education of the weaker sections. It may not be concluded from this analysis that an increase in investments in the education of the weaker sections would be of no use, as discrimination exists in the labour market against them. On the other hand, more investment in the education

of the weaker sections would lead to equality in human capital formation, and also to a reduction in the scope for discrimination in the labour market, enabling women and the backward castes as groups to fight against discrimination.²⁹

²⁹ See Ram (1980) for a discussion on the relationship between education, discrimination and rates of return.

Summary and Conclusions

This study is an attempt to focus attention on inequalities in returns to education of different groups of population. In this chapter, we will present a brief summary of the main conclusions and their implications. At the outset, we set ourselves the task of verifying the following clearly formulated hypotheses. First, the returns to education accrue differently to different groups of population. In other words, the rates of return to education are lower for the weaker sections than for their counterparts, the weaker sections being women and the backward castes. Second, there exists inequality in human capital formation between different groups of the population and the distribution is skewed against the weaker sections. Third, weaker sections are subject to labour market discrimination in employment and wages.

The attempt to test these hypotheses was confined to the State of Andhra Pradesh and to the West Godavari District therein, where a sample survey was conducted for this purpose. The survey yielded data on various personal characteristics of the respondents such as education, age, experience, earnings and occupation, and covered approximately 1,000 members in the work force belonging to about 400 randomly selected households. Data from published and unpublished secondary sources relating to the district and the state were used in the context of several related aspects, such as institutional cost of education, economic growth, and participation in the labour force.

Using the survey and secondary data and following the internal rate of return method, the rates of return to various levels of education—literacy to higher general and professional levels—have been estimated for sex and caste groups and for the sample population as a whole. The limitations of the rate of return method are well-known and it is not necessary to repeat them here. While many of the objections raised against this method have been satisfactorily dealt with in literature, this method, nevertheless fails to capture the externalities of education. That no quantitative approach to educational planning can take into account this aspect might soften the critics. However, while describing the method earlier, we argued that the rate of return analysis continues to be an effective tool for intra-sectoral and inter-group planning of investment in education. Crude marginal and average rates of return have been estimated from private and social angles, which have then been adjusted for factors like wastage and stagnation in education, growth in incomes, unemployment, participation in the labour force and ability.

The crude rates of return, in general, are found to decline with increasing levels of education. For instance, the crude private marginal rates of return for the sample population as a whole are 33.4 per cent to primary, 25.0 per cent to middle, 19.8 per cent to secondary, 14.0 per cent to intermediate and 9.0 per cent to higher (general) level. The crude social rates of return are slightly lower than the private rates, but they also show a similar pattern. However, the varying magnitudes of the factors of adjustment do not reveal the same pattern, when we come to the fully adjusted rates of return. The adjustments, on the whole, pushed down the rates of return significantly. Among the adjustment factors, the incidence of wastage and stagnation, particularly at the secondary and intermediate levels of education, had a very serious effect, pushing down the rates of return to these two levels of education significantly and making them even negative.

The sex-wise and caste-wise rates of return also show these general characteristics. Further, contrary to the general belief, the crude rates of return for women were found to be greater than the returns for men to most levels of education. Since the costs of women's education, private as well as social, are relatively lower, despite lower average earnings, the returns for women are higher compared to men. Among the adjustment factors, participation in

the labour force is so important, that the pattern of the adjusted rates was the reverse of the sex-wise order of the crude rates of return, the implication being that if the labour force participation rates for women and men were similar, the returns to women's education would be higher and, in any case, would not be less than the returns to men's education.

Again, contrary to popular belief that the returns to education of the backward castes would be low, as they come from a relatively poor socio-economic background, our results show that this is not true. With a few exceptions, both the marginal and average rates of return to the education of the backward castes were found to be above the corresponding rates for the non-backward castes. This is true in respect of private as well as social rates of returns. This is seen despite wage discrimination against the backward castes, and is mainly because of the lower costs of their education compared to the non-backward castes. Nevertheless, it may be noted that the lower costs or investment in the education of the backward castes, at the same time, reflects the poor quality of education the backward castes receive.

Closely related factors that provide an insight into the problem of inequality in returns to education are inequality in human capital formation and labour market discrimination. The indices of the stock of total human capital and the stock of active human capital in the State of Andhra Pradesh establish the fact of underinvestment and mal-investment in the education of the weaker sections. The per capita and per person of the labour force total as well as active human capital stocks were found to be lower for women and the backward castes compared to men and the non-backward castes respectively. The reasons for this pattern of inequitable distribution of human capital stocks could be traced to social and economic factors and to the inadequacies of public policy.

At the same time, it is clear from the coefficients of discrimination that both women and the backward castes are subject to severe wage discrimination. The analysis of employment discrimination, which was confined to sex groups only due to lack of data relating to caste groups, shows that women are subject to employment discrimination as well.

Coming to policy implications, the coefficients of inequality in human capital and the coefficients of discrimination in the labour

market clearly suggest from the equity point of view that there should be more investment in the education of the weaker sections. The estimates of rates of return also reiterate the same. Thus, both equity and efficiency criteria lead to unanimous conclusions. An increase in the level of education of the weaker sections reduces the inequality in human capital, and also reduces discrimination in the labour market. Since the rates of return to investment in the education of the weaker sections, particularly in respect of the backward castes, are higher, it is precisely in the weaker sections in India, where the best unexhausted opportunities to make further investment in education exist. Until now, such a step has been justified on social, cultural and historical grounds. Our results show that this is justified on strictly economic efficiency grounds as well. Similarly, there could be large social returns to investment in the education of women, provided effective measures to improve their participation in the labour force and to reduce wastage in their education are adopted. Even otherwise, if efforts are made to quantify and compute the value of non-market work of people in general, and of women in particular, it would enhance the returns to education in general and for women in particular. Further, efforts to reduce social and cultural discrimination in schools along with labour market discrimination against the backward castes and women would considerably enhance private as well social welfare. Above all, it is necessary to revolutionise the thinking and attitudes of the people as well as the public policy-makers towards education, such that education is eventually regarded not only as a productive investment, but an all-pervasive development activity of human welfare.

Appendices

STATISTICAL APPENDIX

TABLE 3.1 Salient Features of the Places of the Sample Survey

Name of the Place	Population	Number of Households	Rate of Literacy Per Cent	Per Cent of Workers to Total Population	Number of Educational Institutions
					P M H C L
Purushottapalli	2,728	606	39.11	43.29	1 1 1 . .
Nallajerla	6,542	1,396	29.44	45.22	6 . 1 . .
Khandavalli	8,486	1,691	35.82	32.93	6 . 1 . .
Srungavruksham	7,740	1,764	40.00	43.06	1 1 1 . .
Denduluru	7,894	1,741	32.87	30.88	5 . 1 . .
Jeelugumilli	1,726	348	24.57	39.05	1 . 1 . .
Borrampalem	3,749	785	22.09	42.55	2 1 1 . .
Gummaluru	4,955	1,090	33.76	49.02	10 . 1 . .
Tadepalligudem	43,610	9,303	46.53	31.21	8 2 3 2 8

Note:

P: Primary schools

M: Middle schools

H: High schools

C: Colleges

L: Libraries

: Nil

Source: Census of India, 1971 (District Census: West Godavari).

TABLE 5.1 Results of the Simple Linear Regression of Log Earnings on Years of Schooling

<i>Men</i>	Log EARN = 3.11 + 0.0497S (127.8) (22.05)	R ² : .4221	R = .6497
<i>Women</i>	Log EARN = 3.14 + 0.0340S (88.06) (10.58)	R ² : .3010	R = .5486
<i>Backward Castes</i>	Log EARN = 3.15 + 0.0374S (109.36) (13.25)	R ² : .3133	R = .5597
<i>Non-Backward Castes</i>	Log EARN = 3.11 + 0.0490S (106.63) (19.06)	R ² : .4017	R = .6338
<i>Sample Population</i>	Log EARN = 3.13 + 0.0437S (154.23) (23.42)	R ² : .3714	R = .6094

Note: EARN: Annual Earnings (Rs)

S : Years of Schooling

All the coefficients are significant at 1 per cent level.

Figures in parentheses are t-values.

TABLE 5.2 Labour Force Participation, Age and Education

A. The Coefficients of Correlation of Labour Force Participation Rates with Age and Years of Schooling

	Correlation Coefficient of Labour Force Participation	
	With Age	With Years of Schooling
Men	.51	.62
Women	.24	.54
Total population	.46	.77

B. The Coefficients of Simple Linear Regression of Labour Force Participation Rates (with t-values in parentheses)

	Simple Linear Regression Coefficient of Labour Force Participation	
	Age (Set I)	Years of Schooling (Set II)
Men	0.8040 (1.51)	1.7238 (1.59)
Women	0.1544 (0.61)	1.8054 (1.28)
Total population	0.4991 (1.28)	2.6758* (2.41)

Note: * Significant at 5 per cent level.

TABLE 6.1 Adjustment Factors: Wastage and Stagnation, Unemployment and Ability (per cent)

<i>Educational Level</i>	<i>All</i>	<i>Men</i>	<i>Women</i>	<i>Non-Backward Castes</i>	<i>Backward Castes</i>
<i>Promotion/Pass Rates</i>					
Primary	34.40	35.75	32.40	35.43	29.44
Middle	62.09	64.52	57.09	63.36	52.11
Secondary	20.14	19.43	22.14	20.55	16.90
Intermediate	20.43	19.36	23.93	20.85	17.15
I degree (general)	62.56	61.66	61.54	63.85	52.52
II degree (general)	89.64	88.35	88.17	91.48	75.25
Higher (general)	57.79	59.95	56.84	58.99	48.52
<i>Unemployment/Average Waiting Period (in months)</i>					
Literacy	23	23	20	17	28
Primary	31	31	31	38	28
Middle	42	41	45	53	35
Secondary	40	48	24	31	49
Intermediate	18	19	17	18	18
I degree (general)	37	39	22	36	38
II degree (general)	10	10	10*	10	10*
Higher (general)	36	39	20	36	37
<i>Ability: Coefficient of Education (per cent)</i>					
All levels	0.70	0.80	0.60	0.75	0.65

Note: * assumed to be the same as in the case of their counterparts with the same level of education because of non-availability of data.

TABLE 6.2 Adjustment for Non-Participation in Labour Force: Rate of Participation in the Labour Force (Adjusted for Unemployment) (per cent)

	<i>All</i>	<i>Men</i>	<i>Women</i>	<i>Backward Castes</i>	<i>Non-Backward Castes</i>
<i>By Educational Levels</i>					
Illiteracy	40.33	56.43	27.25	80.15	62.30
Literacy	35.35	52.99	5.70	80.15	62.30
Primary	47.13	67.45	7.71	80.15	62.30
Middle	30.81	43.05	8.56	80.15	62.30
Secondary	58.92	68.06	16.99	80.15	62.30
Higher	79.87	84.51	51.16	80.15	62.30
All levels	41.70	58.73	24.26	80.15	62.30
<i>By Age Groups</i>					
0-14	9.31	11.90	6.67	..	..
15-19	53.70	72.27	33.96	..	..
20-24	62.23	89.48	36.15	..	..
25-29	66.70	97.61	38.14	..	..
30-39	69.70	98.65	40.48	..	..
40-49	72.07	98.31	42.11	..	..
50-59	67.41	95.33	37.11	..	..
60+	46.66	74.06	19.12	..	..
Age not stated	21.46	29.36	10.38	50.88	39.50
All age groups	41.70	58.73	24.26	..	..
15-59	65.77	92.46	29.55	..	..

GENERAL APPENDIX

5.1. Educational Classification

For each member of the work force the level of education noted in the survey schedules was the highest that he or she had attained. In case of failure to complete a course, education recorded was the previous level successfully completed. The age at which education of a given level usually begins and ends (as assumed in this study) and the normal number of years of a given level of education are as follows:

Level of Education	Age Group	Years of Schooling of the Given Level	Cumulative Years of Schooling
Literate	6-9	4	4
Primary	6-10	5	5
Middle	11-13	3	8
Secondary	14-15	2	10
Intermediate	16-18	2	12
I degree (general)	19-21	3	15
II degree (general)	22-23	2	17
Higher (general)	19-23	5	17
Higher (professional)	19-23	5	17

Literate is assumed to be having four years of formal schooling. High/higher secondary level is abbreviated throughout the text as 'secondary'. There are a few cases of school level vocational education in our sample. They are also included in this category. Intermediate level includes a few cases of diploma/certificate not equivalent to a degree in general education. I degree (general) level includes any degree in arts, commerce or general science (viz., B.A., B.Com., and B.Sc.), II degree (general) includes post-graduate degree in arts, commerce and general science (viz., M.A., M.Com., and M.Sc.). Very few cases of doctoral degree have been included in this category. Higher (general) includes I degree (general) and II degree (general). Higher (professional) includes I and II degree in professional subjects, but in most cases in our sample, it is the I degree only.

Glossary of Symbols

The list of frequently used symbols in this study along with their meanings, unless otherwise stated, are as follows:

<i>Symbol</i>	<i>Meaning</i>
—	Not applicable
..	Not available or not estimated
.	Nil or negligible
—ve	Negative
α	Alpha coefficient (proportion of the gross earnings differentials attributable to education)
AHC	Stock of active human capital
AHCI	Index of the stock of active human capital
B	Benefits of education
BCR	Benefit-cost ratio
C	Costs of education
CIAHC	Coefficient of inequality in the stock of active human capital
CITHC	Coefficient of inequality in the stock of total human capital
D_e	Coefficient of employment discrimination
D_w	Coefficient of discrimination in wages
E	Average individual earnings per annum (in rupees)

Educational Levels

E_0	Illiterates (no formal schooling)
E_1	Literates (assumed to be having four years of schooling)
E_2	Primary
E_3	Middle
E_4	Secondary
E_5	Intermediate/pre-university
E_6	I degree (general)
E_7	II degree and above (general)

E_8	Higher (I degree/II degree or above general)
E_9	Higher (professional)
IRR	Internal rate of return
N	Enrolment of pupils
n	Age of retirement
NPV	Net present value

Occupational Groups

O_1	Cultivators, agricultural labourers, livestock, etc.
O_2	Mining, manufacturing and construction activities
O_3	Trade, commerce and transport
O_4	Other services
P	Total population
p	Proportion of population (with a given characteristic) to total population

Rates of Return

r^*	Internal rate of return
R_0	Unadjusted
R_1	Adjusted for wastage in education
R_2	Adjusted for wastage and growth in incomes
R_3	Adjusted for wastage, growth in incomes and unemployment
R_4	Adjusted for wastage, growth in incomes, unemployment and non-participation in the labour force
R_5	Adjusted for wastage, growth in incomes, unemployment, non-participation and ability
s	The age at which education of the concerned level commences
t	Time period (in years)
THC	Stock of total human capital
THCI	Index of the stock of total human capital
U	Unemployed people (non-workers categorised as 'others' according to Census of India, 1971)
u	Percentage rate of unemployment
W	Total workers
w	Proportion of workers (with a given characteristic) to total workers
Z	Rate of wastage in education

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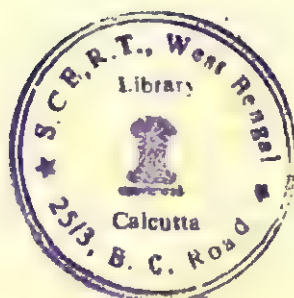
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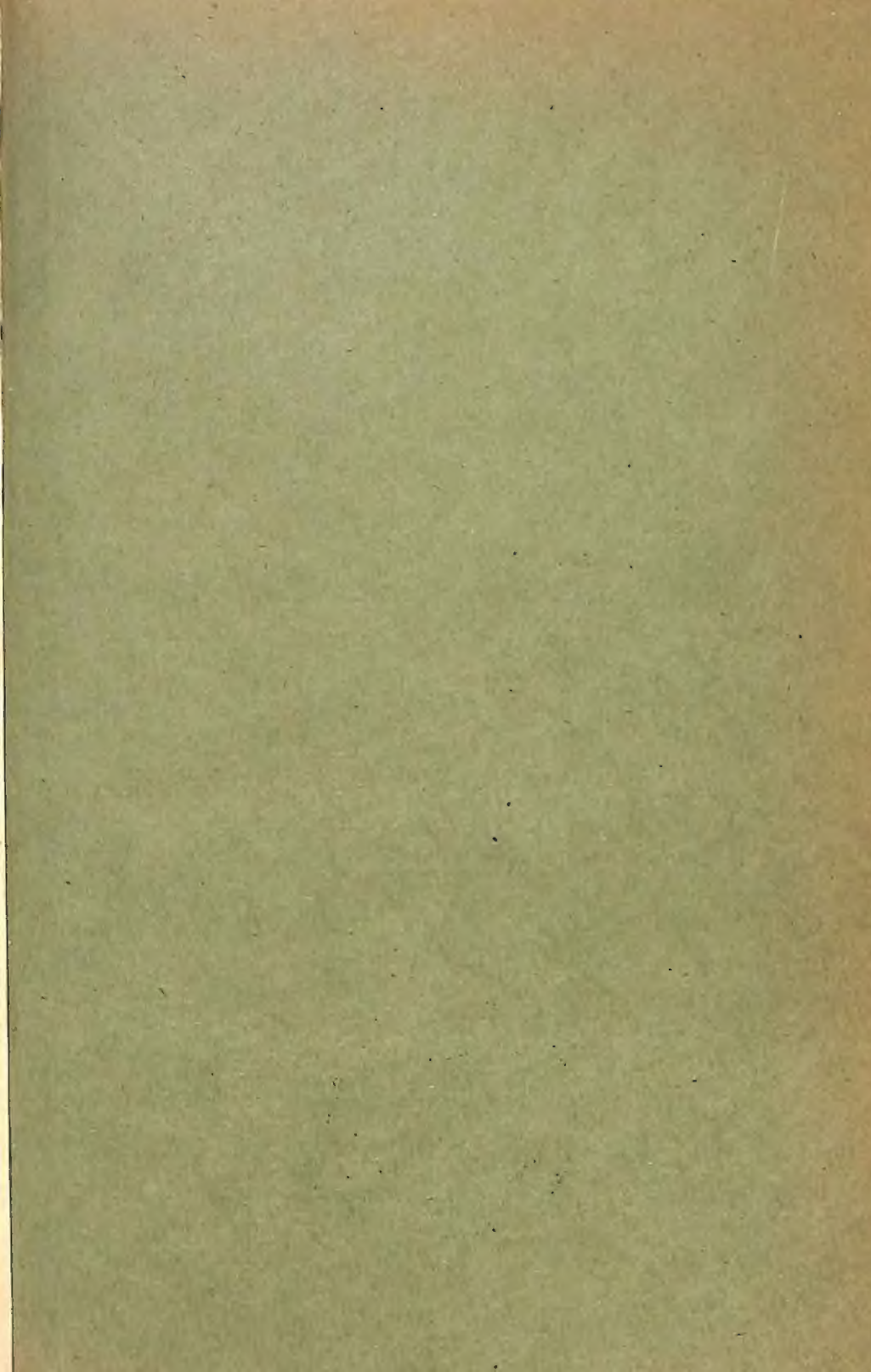
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The author's conclusions are of far-reaching importance and are of particular interest to researchers in the field of the economics of education as also policy-makers and planners.

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With a brilliant academic background from Andhra University and the Delhi School of Economics, from where he obtained his Ph.D., Dr Tilak has to his credit several research papers on various economic aspects of education. His more recent works include *Education and Regional Development* (edited).

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